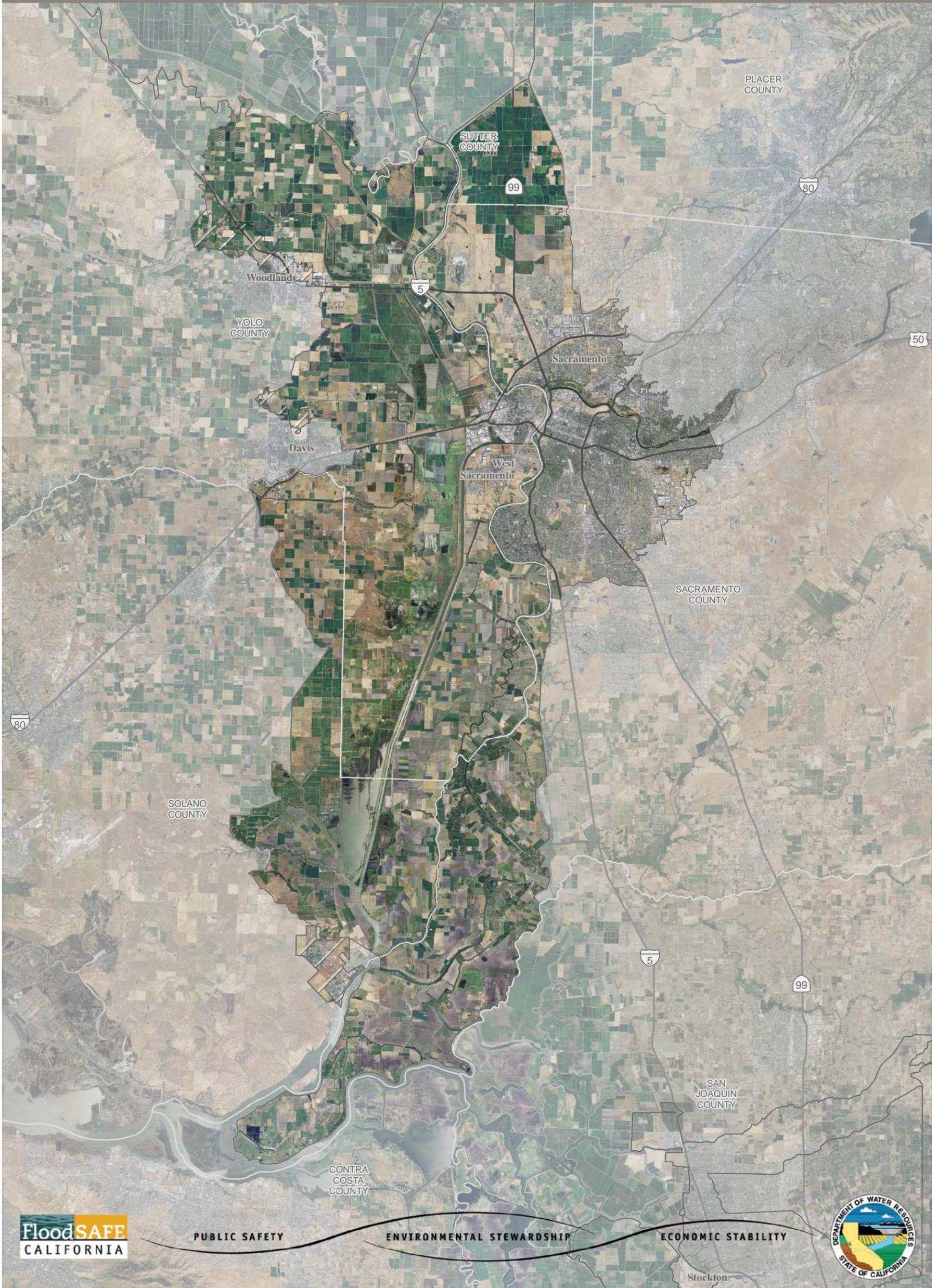


Lower Sacramento River/ Delta North Region Regional Flood Atlas—Draft

REGIONAL FLOOD
MANAGEMENT PLANNING



May 2013



PUBLIC SAFETY

ENVIRONMENTAL STEWARDSHIP

ECONOMIC STABILITY



Regional Flood Management Planning

The California Department of Water Resources (DWR) has launched the Regional Flood Management Planning effort to work with local entities to collect on-the-ground information and to use existing technical studies to formulate feasible projects, assess the performance of the projects, and develop a plan that reflects the vision of local entities in reducing flood risks in their region. DWR plans to provide guidance, as well as technical and financial assistance, to local agencies to prepare regional flood management plans that formulate and prioritize the proposed projects in each region. Regional Flood Management Planning is an important first step in refining and implementing the 2012 Central Valley Flood Protection Plan.

Though the 2012 CVFPP identifies nine regions (Upper Sacramento, Mid-Sacramento, Feather River, Lower Sacramento, Delta-North, Delta-South, Lower San Joaquin, Mid-San Joaquin, and Upper San Joaquin), the majority of the regions have partnered together, resulting in six regions. These six regions are the Upper/Mid-Sacramento River, Feather River, Lower Sacramento River/Delta North, Lower San Joaquin River/Delta South, Mid-San Joaquin River, and Upper San Joaquin River.

Each of the six planning regions has formed a working group that is led by a local agency and consists of representatives from flood management agencies, land use agencies, flood emergency responders, permitting agencies, and environmental and agricultural interests. The regional plans will present local agencies' perspectives of flood management with a prioritized list of projects that need to be implemented to reduce flood risks in each region. Each plan will also present an assessment of the proposed project costs and benefits, considering potential contributions to an integrated and basin-wide solution.

Regional Flood Atlas

During the development of the 2012 Central Valley Flood Protection Plan (CVFPP) the areas protected by the facilities of the State Plan of Flood Control (SPFC) were organized into flood planning regions to account for the variations in land use conditions, flood protection facilities, and flood hazards. Through the regional planning process, FloodSAFE will work with local partners to identify and prioritize proposed regional flood system improvements for each of the six flood planning regions.

This Regional Flood Atlas is primarily graphic depictions of the flood risk characteristics and hazards of the region. The Regional Flood Atlas was compiled from existing data to share understanding and to facilitate discussions about the "current state" of flood risks in the region. The Regional Flood Atlas is a compilation of several ongoing efforts within DWR. The information in the Regional Flood Atlases is a snapshot of those on-going efforts. The Atlas is not intended to serve as a comprehensive environmental setting section under CEQA or NEPA.

During the course of the regional planning effort, additional regional information will be gathered from local agencies to more fully identify the regional flood risk. New information obtained through these meetings and workshops will be used to update the Regional Flood Atlases. When complete, the Final Regional Flood Atlases will be appended to the Draft and Final Regional Plans.

The Lower Sacramento River/Delta North Region includes areas protected by SPFC levees (project levees) near the Sacramento River. The Region's land use includes both rural and large urban areas associated with the Sacramento Metropolitan Area. Additional urban areas are near the City of Davis.

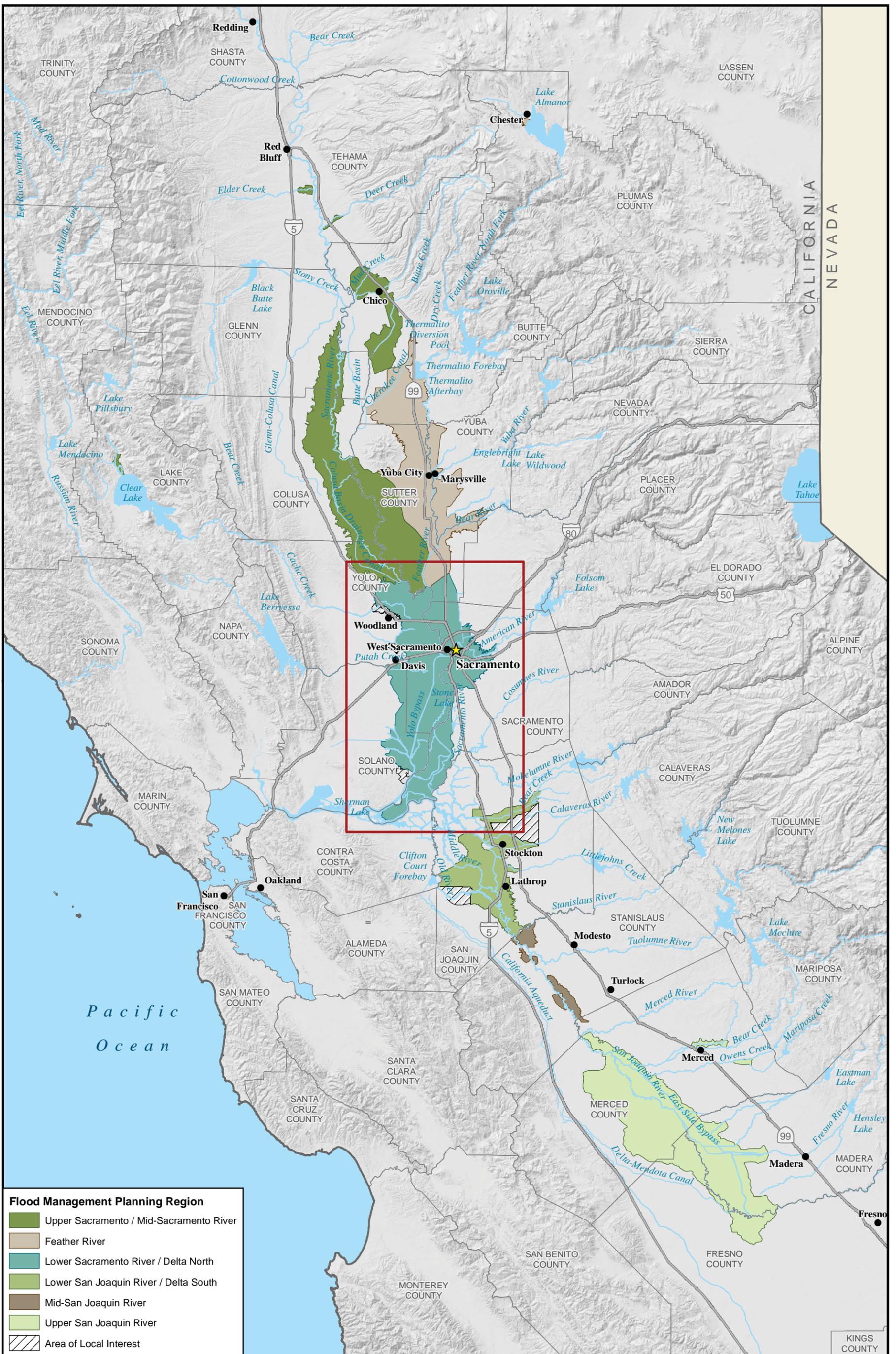


Sacramento Weir with downtown Sacramento in the background, March 2011

The following list of maps has been identified for inclusion in the Lower Sacramento River/Delta North Regional Flood Atlas:

- Map 1 Regional Overview – This map identifies the boundaries and map extent for the Region.
- Map 2 Protected Populations and Assets – This map identifies the distribution of protected populations and assets in the Central Valley.
- Map 3 Levee Flood Protection Zones – This map shows areas within the Region protected by the facilities of the SPFC.
- Map 4 Local Jurisdictions – This map shows the city and county boundaries and will be used to identify the local land use planning authority in order to identify the appropriate land use-based roles and responsibilities.
- Map 5 DWR Integrated Regional Water Management Planning Areas – This map identifies the DWR Integrated Regional Water Management Planning Regions that coincide with the Flood Planning Region.
- Map 6 General Land Use – This map identifies general land uses, including agricultural, urban and native vegetation. This information will be used to identify flood risks of current and future development in the floodplains.
- Map 7 Local Maintaining Agencies – This map identifies the LMA boundaries within the Region.
- Map 8 Existing Critical Facilities and Economic Assets – This map identifies highways, primary county roads, railroads, bridges, airports, docks/marinas, hospitals, police stations, firehouses, and schools.
- Map 9 SPFC and Local Flood Control Facilities – This map identifies the SPFC and Non-SPFC flood control facilities (levees, weirs, pump stations, canals) that provide flood protection. This information will be used to identify and locate all flood facilities in the Region.
- Map 10 Flood Emergency Response Facilities – This map identifies facilities that may be used to support emergency response readiness.
- Map 11 Overall Levee Conditions – This map includes the results of inspection reports, Non-Urban Levee Evaluations/Urban Levee Evaluations, and other known/identified deficiencies or areas of poor past performance.
- Map 12 Seepage Past Performance Problems – This map includes the results from Flood System Repair Program/Urban Levee Evaluations, showing areas which have experienced seepage issues.
- Map 13 Slope Instability Past Performance Problems – This map includes the results from Flood System Repair Program/Urban Levee Evaluations, showing areas which have experienced slope instability issues.
- Map 14 Erosion Past Performance Problems – This map includes the results from Flood System Repair Program/Urban Levee Evaluations, showing areas which have experienced erosion issues.
- Map 15 Other Past Performance Problems – This map includes the results from Flood System Repair Program/Urban Levee Evaluations, showing areas which have experienced a variety of issues including breaches and overtopping.
- Map 16 FEMA 100-Year Floodplain – This map identifies the 100-year flood inundation areas from the FEMA 100-year floodplain.
- Map 17 Channel Capacities and Flood Forecast Monitoring Network – This map identifies the current channel capacities of the SPFC. This information will be used to identify the floodways and their capacities within the region.
- Map 18 Managed Environmental Lands – This map identifies the wildlife refuge areas and critical habitat areas. This information will be used to map ecologically sensitive areas within the region.
- Map 19 Riparian Vegetation, Critical Habitat, and Endangered and Threatened Species – This map identifies riparian vegetation along the rivers and streams affected by the SPFC facilities, and the presence of Critical Habitat or Endangered and Threatened Species within the region.

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Flood Management Planning Region

- Upper Sacramento / Mid-Sacramento River
- Feather River
- Lower Sacramento River / Delta North
- Lower San Joaquin River / Delta South
- Mid-San Joaquin River
- Upper San Joaquin River
- Area of Local Interest

1" = 20 miles

Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North

Regional Overview

DRAFT **DRAFT**

FloodSAFE
 CALIFORNIA DEPARTMENT OF WATER RESOURCES

Prepared By: K. Miller
 Date: May 10, 2013

MAP 1

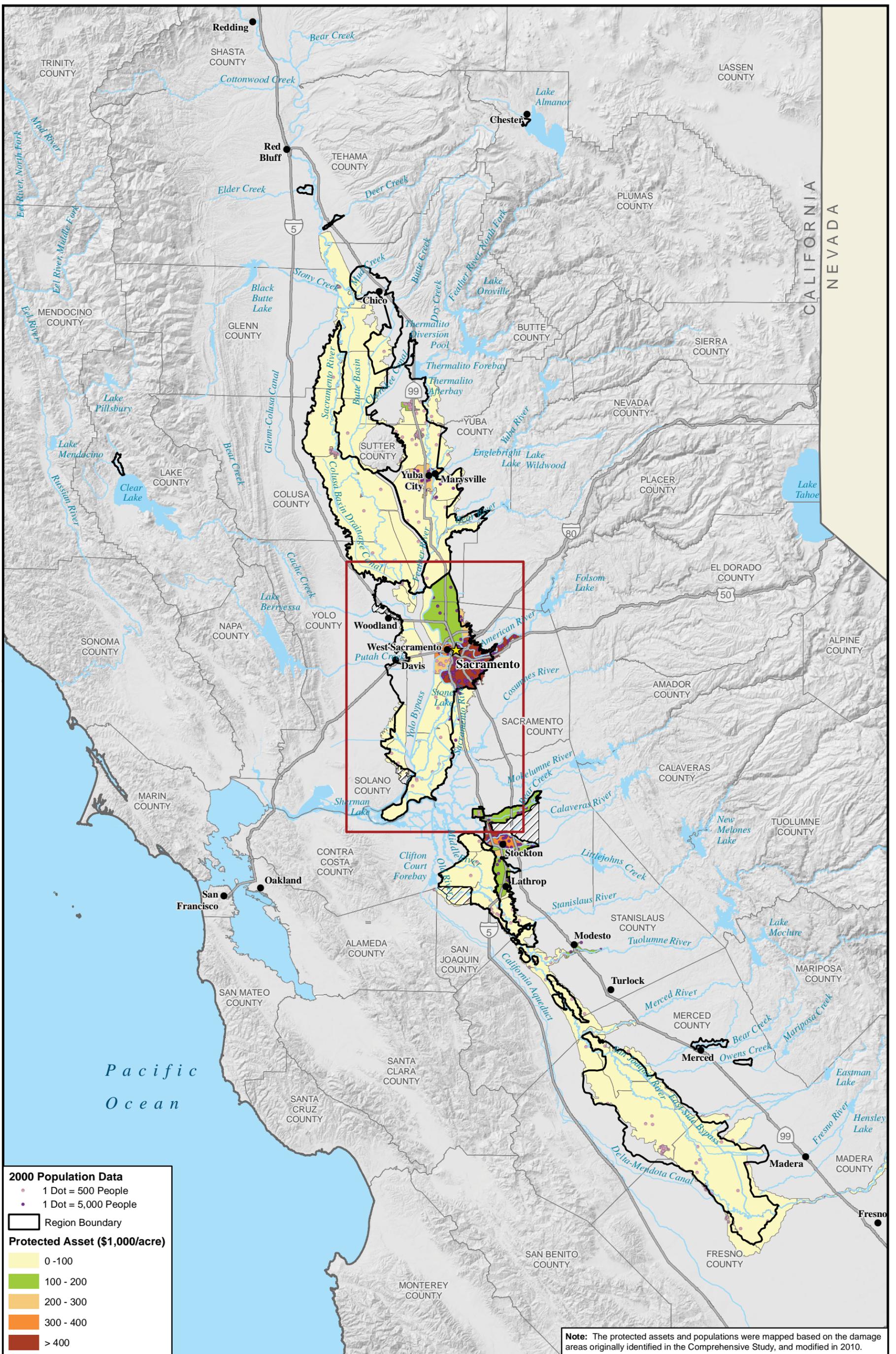
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Map 2 – Protected Populations and Assets

Over the last century, the Central Valley has experienced intensive development to meet the needs of a growing population. A complex water supply and flood risk management system supports and protects a vibrant agricultural economy, several cities, and numerous small communities. The SPFC protects a population of over one million people,

major freeways, railroads, airports, water supply systems, utilities, and other infrastructure of statewide importance, including \$69 billion in assets (includes structural and content value and estimated annual crop production values). Many of the more than 500 species of native plants and wildlife found in the Central Valley rely, to some extent, on habitat existing within the SPFC.





Note: The protected assets and populations were mapped based on the damage areas originally identified in the Comprehensive Study, and modified in 2010.

1" = 20 miles

Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North
Protected Populations and Assets

DRAFT **DRAFT**

FloodSAFE
 CALIFORNIA DEPARTMENT OF WATER RESOURCES

Prepared By: K. Miller
 Date: May 10, 2013

MAP 2

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Map 3 – Levee Flood Protection Zones

Each flood planning region is composed of numerous Levee Flood Protection Zones (LFPZs). Assembly Bill No. 156 (AB156) defines a Levee Flood Protection Zone as the area that receives protection from a levee that is part of the facilities of the State Plan of Flood Control. AB 156 requires the development of the maps that delineate LFPZs using the best available existing information. The LFPZs are intended to show areas protected by project levees at or below design flow, but the LFPZs are not synonymous with a level of protection and should not be construed as such. The Department of Water Resources' Central Valley Floodplain Evaluation and Delineation Program published the initial LFPZs in December 2008.

The LFPZs are generally separated into two groups:

- LFPZ areas subject to flooding from ponding areas with depths greater than three feet. These areas are typically surrounded by levees, so the lateral extent of flooding can be identified. These areas are shown in orange on the published LFPZ maps.
- LFPZ areas subject to flooding from channel or overland flow resulting in unknown flood depths. These areas are not entirely surrounded by levees, so the LFPZ boundaries are thus approximate and should not be considered precise delineations. These areas are shown in yellow on the published LFPZ maps.

LFPZs estimate the maximum area that may be inundated if a project levee fails when the water surface elevation is at the top of a project levee. Zones depicted on this map were created utilizing methods and assumptions described in the LFPZ Map Development Technical Memorandum, and do not necessarily depict areas likely to be protected from flow events for which project levees were designed. The LFPZ Map Development Technical Memorandum was produced by DWR's Division of Flood Management, Floodplain Risk Management Branch.

Lands within the LFPZs may be subject to flooding due to various factors, including the failure or overtopping of project or non-project levees, flows that exceed the design capacity of project or non-project levees, and flows from water sources not specifically protected against by project levees. Lands not mapped within a LFPZ are not invulnerable to flood risk, and some may also experience flooding from these or other processes.

Lower Sacramento River/Delta North Region Flood History

The following flood history was compiled from the Sacramento Multi-Hazard Mitigation Plan (December 2004 and September 2011 update), Yolo Operational Multi-Hazard Mitigation Plan (January 2004), Sutter County California Multi-Hazard Mitigation Plan (May 2007), San Joaquin Local Hazard Mitigation Plan (February 2008), Sacramento County California Multi-Hazard Mitigation Plan (December 2004), California Water Plan Update 2009 from the Sacramento-San Joaquin River Delta Regional Report, the Historical Reference Document for the State Plan of Flood Control (May 15, 2009), and information collected by the Statewide Flood Management Program. The list includes major events beginning in 1955, after substantial completion of flood control infrastructure. Specific information on localized flooding was included where available.

1955 Christmas Floods. Heavy rainfall and snowmelt occurred in the upper watersheds of the eastside tributaries to the San Joaquin River. This caused extensive flooding along the San Joaquin River and all its major eastside tributaries and flooding on the larger westside tributaries. Unusually high tides aggravated the situation by impeding the passage of floodwater through the Sacramento-San Joaquin Delta.

Widespread flooding occurred in Sacramento County including Arcade Creek, Dry Creek and Robla Creeks near the Natomas East Drainage Canal, the Morrison Stream Group, Elder Creek, Florin Creek, Unionhouse Creek, and Laguna Creek.

1958 Storm and Flood Damage

1962-1963 October 1962 Floods. Dry and Robla Creeks spread from 800 feet to approximately one mile. Highwater was within 2 feet of the top of the levee on the southern side of Robla Creek and along the Magpie Creek Diversion channel. Floodwaters from Magpie Creek bypassed the upper portion of the diversion levee and flowed into lower Magpie Creek. Arcade and Cripple Creeks flooded. Flood damage to agricultural and public facilities during the 1962-1963 flood was particularly severe along the streams flowing from west side tributaries.

December – February Flooding: Flooding Arcade Creek, Dry Creek and Robla Creek in the vicinity of Natomas East Main Drainage Canal, Magpie

Creek, and the Morrison Creek Stream Group. Flooding on Strong Ranch and Chicken Ranch Sloughs.

1964-1965 Northern California Christmas 1964 Disaster. Morrison Creek flooded a large region west of the Western Pacific Railroad tracks and south of Meadowview Road.

1969 Winter Storms. Flooding occurred mainly on agricultural lands west of the Union Pacific Railroad tracks in the Beach-Stone Lakes area.

1972 June 1972. The levee failure of Andrus Island was the only event ever to result in significant seawater intrusion, though the threat remains.

1974 Floods. January through March — Sacramento Valley

1980 January-February 1980. A combination of high tides and flood-level flows caused breaches in and rapid deterioration of private levees. Approximately 11,300 acres of agricultural land were inundated on Webb and Holland tracts and Prospect and Dead Horse islands.

September 1980. An Old River levee failed causing the 5,200-acre Lower Jones Tract to flood.

1981 October and November 1981. Heavy storms raised river levels, leading to another failure of the Prospect Island levee and failure of Franks Tract (200 acres) in December.

1982 August 1982. The McDonald Island levee failed, inundating 5,800 acres of farmland.

November 1982. High tides and winds contributed to the failure of Venice Island.

December through March Winter Storms 1982-1983. This declared federal disaster was brought on by El Niño weather conditions. Extremely wet conditions, coupled with voluminous Sierra runoff, led to very high river stages throughout the system. This event caused extensive damage to the flood management system of the Sacramento Valley.

A levee failure near County Road (CR) 102, in Yolo County caused flooding in the western extent of the Region which is now Woodland's industrial area.

1983 January 1983. Levees failed at Mildred Island, Shima Tract, Fay Island, Little Franks Tract, and Prospect Island.
December 1983. Levees failed at Bradford Island.

1986 February 1986. Record high tides and record Sacramento River inflow both occurred, leading to failure of Tyler and Dead Horse islands and McCormack-Williamson and New Hope tracts.

Floods – American River/Central Valley: Releases from Folsom Reservoir caused extensive erosion along the toe of the north and south levees of the American River near California State University. The flood resulted in the largest peak flow record on Morrison Creek. Significant flooding resulted from overflows along Arcade Creek. A flood fight prevented a collapse of the east levee of the Sacramento River located five miles north of downtown Sacramento.

1987 Record flows on the Cosumnes River caused widespread failure of the levee system and flooding to dozens of home. Through traffic was discontinued on Highway 99 as floodwater passed over. There was much loss of dairy and other livestock.

1992 Flooding and Winter Weather

1995 Severe Weather Storms. Record high water was recorded on Arcade Creek, Cripple Creek, Dry Creek, Elk Grove Creek, Linda Creek, Morrison Creek, Natomas East Main Drain and their tributaries. Piped storm drain systems were overwhelmed and there was widespread street flooding. Water ponded in low areas filling to levels that flooded homes. Deep flooding occurred east of the Natomas East Main Drain Canal. Hundreds of homes reported flooding.

1997 January 1997. Over 120,000 people had to be evacuated in Northern California. Several levee breaks were reported across the Sacramento and San Joaquin Valleys. The 1997 flood was considered to be the perfect storm as 100-year peak flows from multiple major rivers collided and flowed into the Yolo Bypass and down to the Sacramento River Delta. There was a major, successful, flood fight at Andrus Island, potentially affecting the City of Isleton.

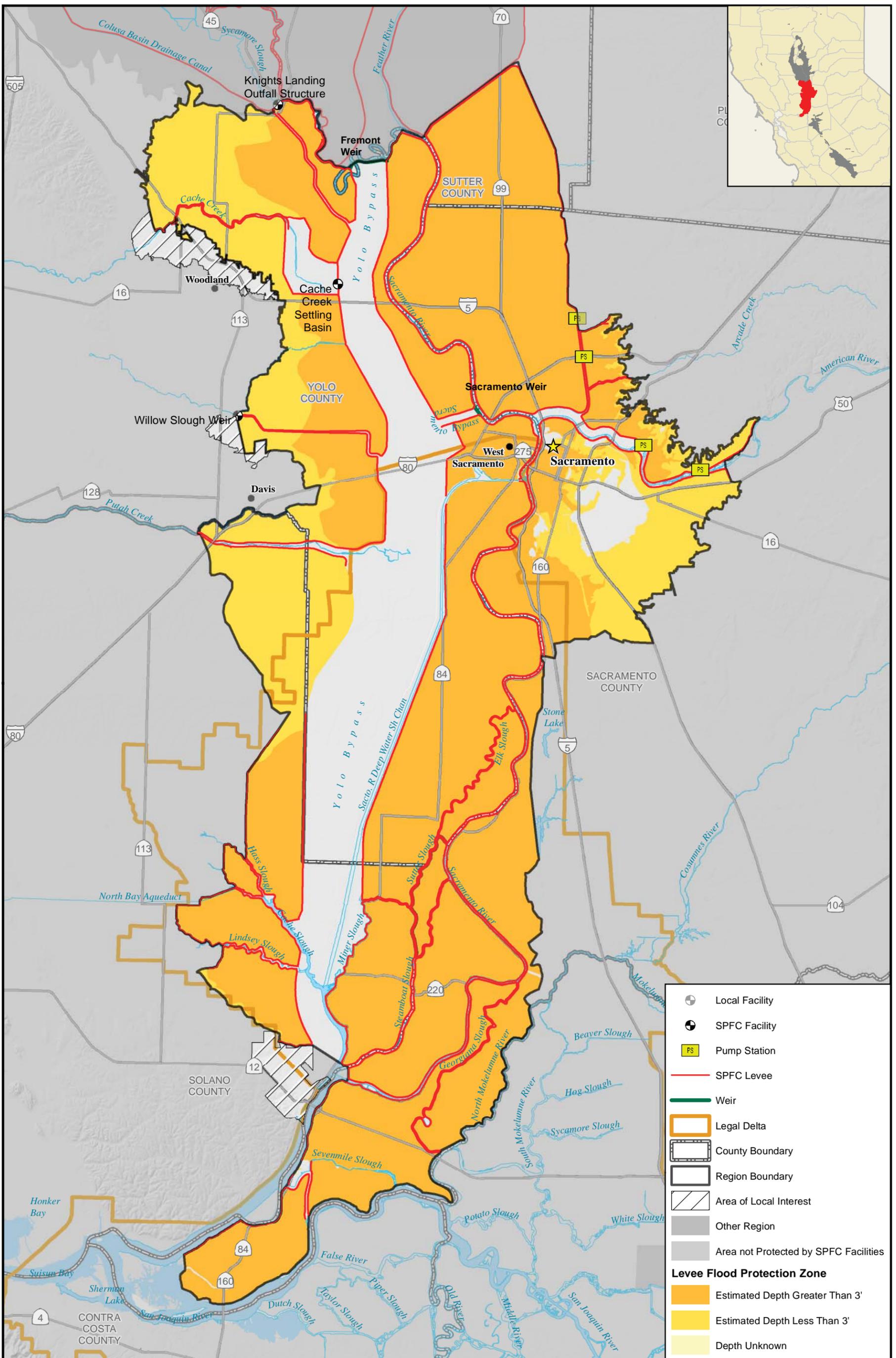
1998 Flood-El Nino 1998

1999 Urban and Small Stream Flooding

2004 June 2004. The Lower Jones Tract levee failed, inundating the island.

2005/2006 Winter Storms

2008 January Storms



	Local Facility
	SPFC Facility
	Pump Station
	SPFC Levee
	Weir
	Legal Delta
	County Boundary
	Region Boundary
	Area of Local Interest
	Other Region
	Area not Protected by SPFC Facilities
Levee Flood Protection Zone	
	Estimated Depth Greater Than 3'
	Estimated Depth Less Than 3'
	Depth Unknown

1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
Levee Flood Protection Zones

DRAFT **DRAFT**

Prepared By: K. Miller		MAP 3
Date: May 10, 2013		
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Map 4 – Local Jurisdictions

The Jurisdictions Map provides the boundaries for cities, counties, and tribes located within or near the flood management planning region. These entities may provide services related to flood management planning such as: land use regulation and planning, public works engineering and maintenance, and emergency services.

The Lower Sacramento River/Delta North Region crosses four counties and six cities: Sacramento County, Solano County, Sutter County, Yolo County, the City of Davis, the City of Sacramento, the City of West Sacramento, the City of Woodland, the City of Isleton and the City of Rio Vista. The incorporated city and county boundaries illustrated on the map were obtained from CALFIRE 2010 (<http://www.fire.ca.gov>). For more details on the flood management planning boundary, please refer to Map 3 and text.

Joint Power Authorities, such as those formed in the Sacramento and San Joaquin river basins in a response to floods in the 1980s and 1990s, facilitate the cooperation of local agencies for flood management in urban areas. The Sacramento Area Flood Control Agency (SAFCA), West Sacramento Area Flood Control Agency (WSAFCA), and FloodSAFE Yolo are incorporated in the Lower Sacramento River/Delta North Flood Management Planning Region.

Contact information for these entities can be found in the Directory of Flood Officials published by DWR in September 2011.

Disadvantaged Communities (DAC)

DWR recognizes that disadvantaged communities (DAC) may exist within each region. DACs may be eligible for grants or additional State financial assistance for local flood control efforts. DAC status can be confirmed using the Department of Water Resources, Disadvantaged Community Mapping Tool:

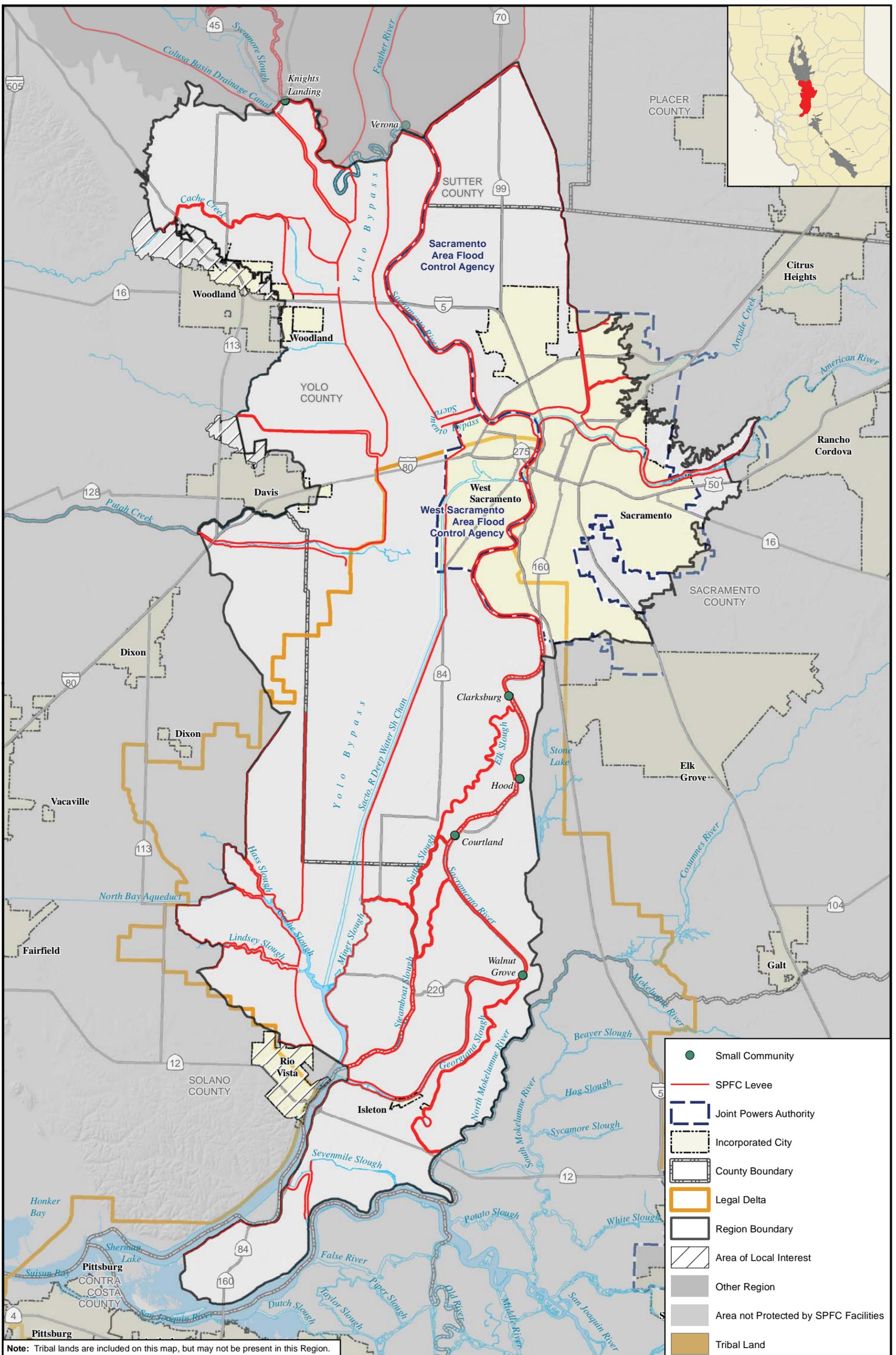
http://www.water.ca.gov/irwm/integregio_resourceslinks.cfm#DAC

Tribal Land Boundaries

The locations of Tribal Land boundaries from the Bureau of Indian Affairs (BIA) were used to determine if tribal lands exist within the Region. Very few of the identified Tribal Lands are located in or adjacent to the Flood Management Regional Areas. Where present, the Tribal names are provided. No tribal lands were identified in this region. <http://www.bia.gov>



Sacramento deep water channel



Note: Tribal lands are included on this map, but may not be present in this Region.

1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
Local Jurisdictions
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FloodSAFE
 CALIFORNIA DEPARTMENT OF WATER RESOURCES
 Prepared By: K. Miller
 Date: May 10, 2013
MAP 4
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Map 5 – DWR Integrated Regional Water Management Planning Areas

Integrated Regional Water Management (IRWM) incorporates the physical, environmental, societal, economic, legal, and jurisdictional aspects of water management into regional solutions through a collaborative stakeholder process to promote sustainable water use. IRWM improves water management and helps ensure economic stability, environmental stewardship, public safety and other benefits.

Flood management is a critical component to IRWM. As part of the Regional Flood Management Planning Effort, flood management strategies will be developed for the Flood Management Regions as part of the Regional Plan, and integrated into the IRWM Plans that coincide with the Regional Plan Area. Coordination between Regional Flood Management Planning and the overlying IRWM Planning Areas is encouraged.

Consideration on how efforts by Flood Management Planning will be integrated with ongoing IRWM planning and implementation activities being conducted by IRWM Regional Water Management Groups (RWMGs) will be necessary for assessing and comprehensively addressing water supply, water quality, flood, and ecosystem challenges.

Within the Lower Sacramento River/Delta North Flood Management Planning Region, the IRWM RWMGs that have been established and are undertaking regional planning and implementation efforts are American River Basin, North Sacramento Valley Group, and Westside (Yolo, Solano, Napa, Lake, and Colusa).

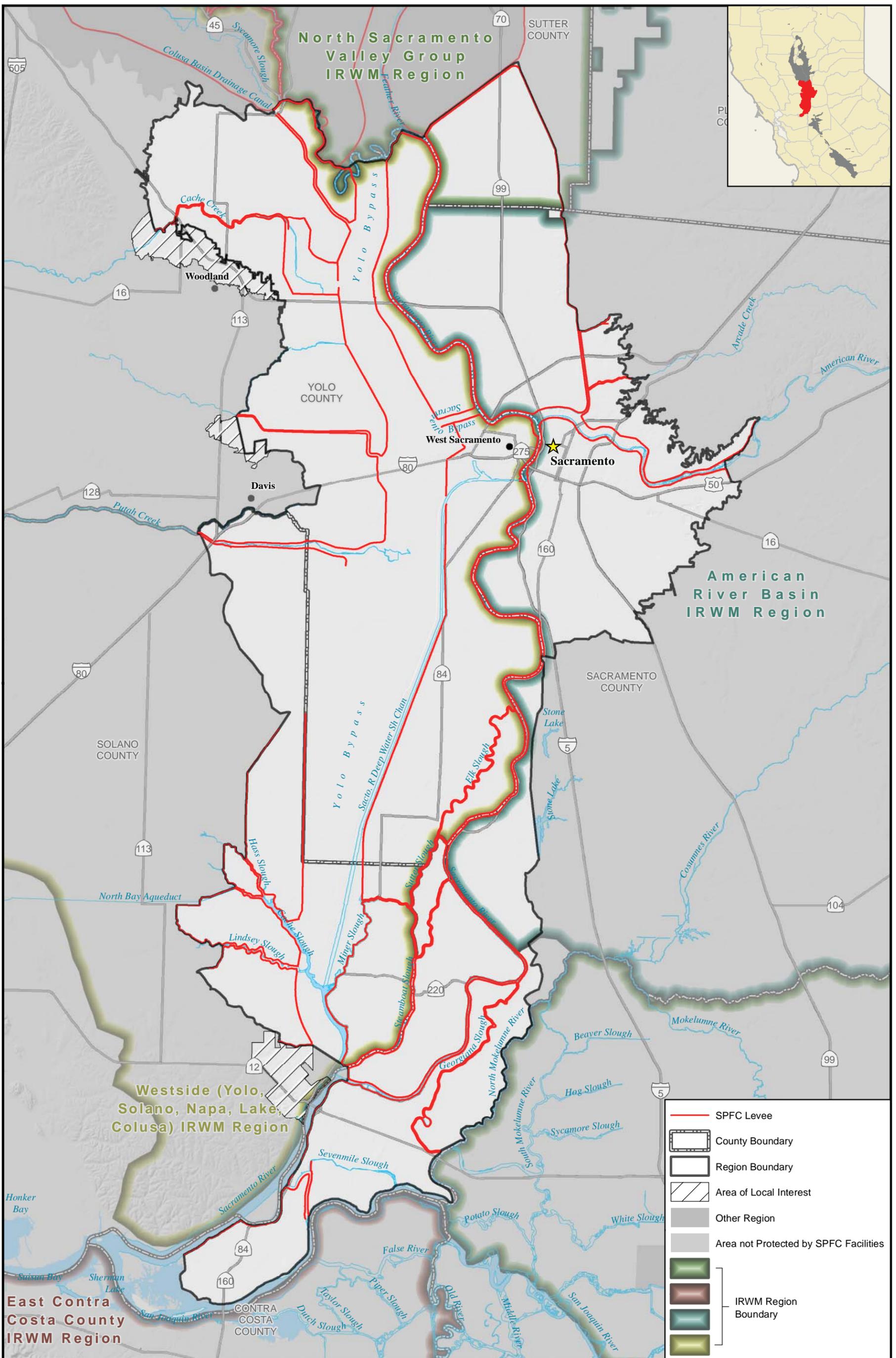
Over the past decade, California has improved its understanding of the value of regional planning and made significant steps in implementing IRWM. Recognizing the current efforts of the IRWM RWMGs and closely coordinating the approach for development of regional flood management plans will be critical for promoting and establishing a regional planning and implementation framework to achieve the goals of water supply reliability and reducing flood risks.



An example of integrated storm water management

Contact Information

IRWM Regions	Agency	Contact	Email	Phone	Agency Website
American River Basin	Regional Water Authority	Rob Swartz	rswartz@rwah2o.org	(916) 967-7692	http://www.rwah2o.org/rwa/programs/irwmp/
North Sacramento Valley Four County Group	Butte County Water and Resource Conservation	Vickie Newlin	vnewlin@buttecounty.net	(530) 538-2179	http://buttecounty.net/Water%20and%20Resource%20Conservation
Westside (Yolo, Solano, Napa, Lake, Colusa)	Westside Public Information Coordinator	Kim Floyd	info@westsideirwm.com	(530) 661-8115	http://www.westsideirwm.com/



1" = 4 miles
 0 1 2 4 Miles



Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
DWR Integrated Regional Water Management
Planning Areas

DRAFT

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Prepared By: K. Miller
 Date: May 10, 2013

MAP 5

File: Z:\Projects\109146\Map05_IRWMs.mxd

Map 6 – General Land Use

This map presents recent general land use based on the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP) Land Use Data. The following FMMP land use surveys were used to represent the land use conditions in the Lower Sacramento River/Delta North Region:

- Sacramento (2010), Sutter (2010), San Joaquin (2008), Solano (2010), and Yolo (2010) Counties

Land use is described by the following categories:

- Urban and Build-Up Lands – Urban and Built-Up land is occupied by structures with a building density of at least 1 unit to 1.5 acres, or approximately 6 structures to a 10-acre parcel. Common examples include residential, industrial, commercial, institutional facilities, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, and water control structures.
- Rural and Semi-Agricultural Lands – This includes residential areas of one to five structures per ten acres. This includes semi-agricultural lands such as farmsteads, agricultural storage and packing sheds, unpaved parking areas, composting facilities, equine facilities, firewood lots, and campgrounds.
- Native Vegetation and Grazing Land –
 - » Land on which the existing vegetation is suited to the grazing of livestock. This category is used only in California and was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.
 - » Land which does not meet the criteria of any other category. Typical uses include low density rural development, heavily forested land, mined land, or government land with restrictions on use. This category was subdivided into: Rural Residential Land (R), Vacant or Disturbed Land, Confined Animal Agriculture, and Nonagricultural and Natural Vegetation beginning with the 2004 data. Subsequently, R was subdivided into: Semi-Agricultural and Rural Commercial Land and Rural Residential Land beginning with the 2006 data.
 - » Land which consists of open field areas that do not qualify for an agricultural category, mineral and oil extraction areas, and rural freeway interchanges.
- Prime and Statewide Importance Farmland –
 - » Prime Farmland - Irrigated land with the best combination of physical and chemical features able to sustain long term production of agricultural crops. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.

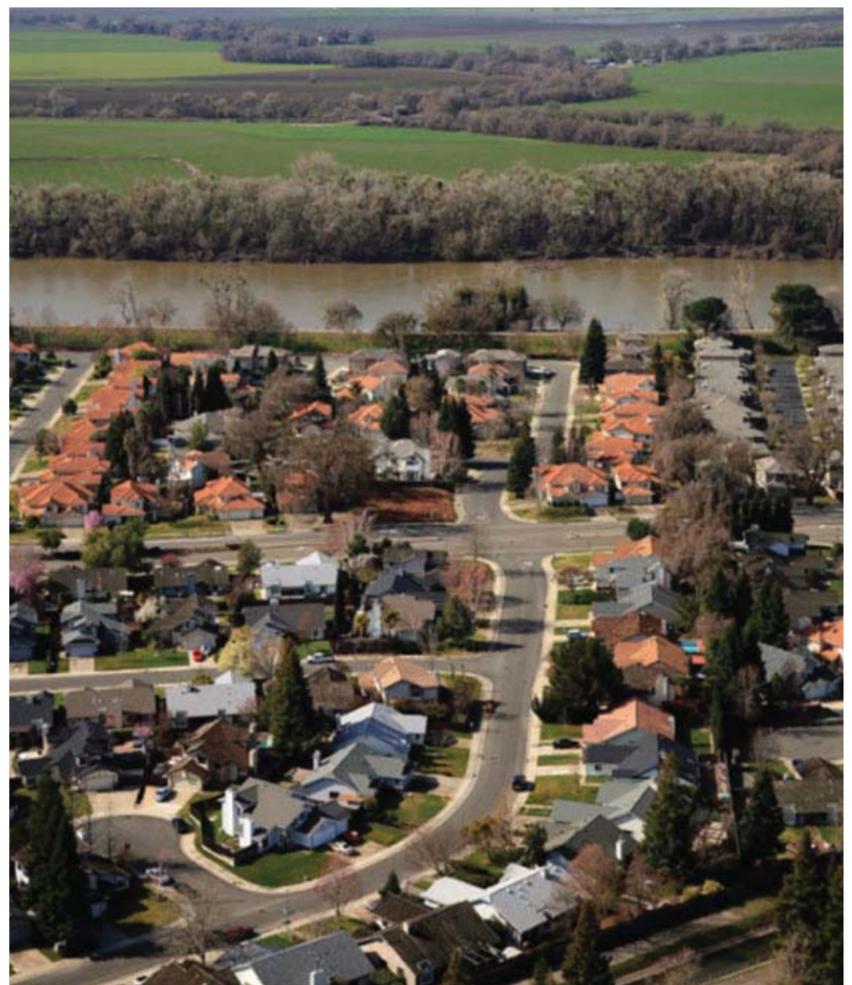
- » Farmland of Statewide Importance - Irrigated land similar to Prime Farmland that has a good combination of physical and chemical characteristics for the production of agricultural crops. This land has minor shortcomings, such as greater slopes or less ability to store soil moisture than Prime Farmland. Land must have been used for production of irrigated crops at some time during the four years prior to the mapping date.

- Local and Unique Farmland –

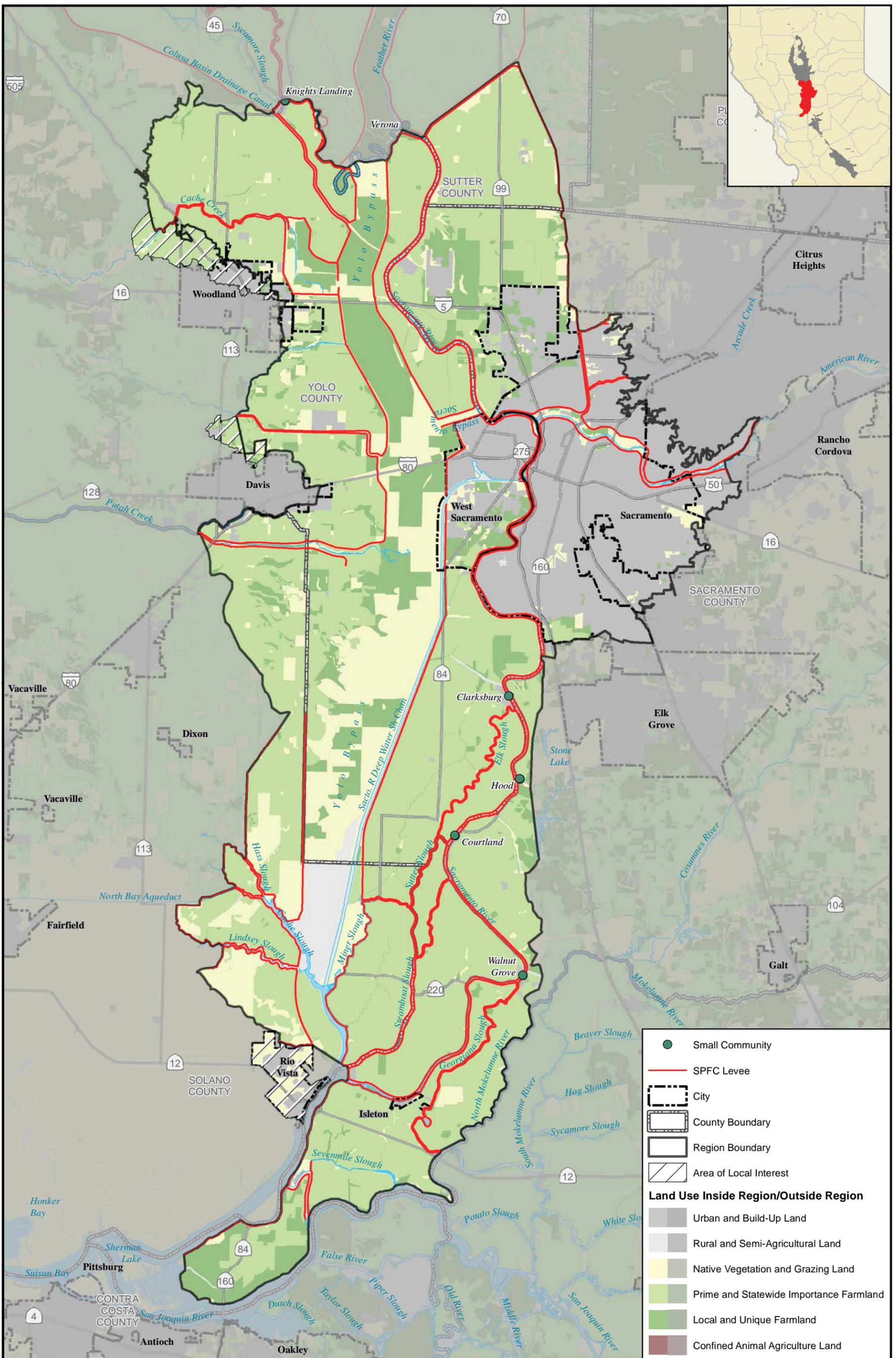
- » Farmland of Local Importance - All farmable lands that do not meet the definitions of Prime, Statewide, or Unique. This includes land that is or has been used for irrigated pasture, dryland farming, confined livestock and dairy, poultry facilities, aquaculture and grazing land.
- » Unique Farmland - Lesser quality soils used for the production of the state's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the four years prior to the mapping date.
- » Confined Animal Agriculture Land - This includes aquaculture, dairies, feedlots, and poultry facilities. Confined Animal Agriculture qualifies for Farmland of Local Importance in some counties.

The Lower Sacramento River/Delta North Region has large areas of urban land use located within the City of Sacramento, County of Sacramento, and the City of West Sacramento. The City of Isleton and a small portion of the City of Woodland are located within the region. Prime and Statewide Important Farmland and Local and Unique Farmland are a significant portion of the non-urban planning area with some large areas of Native Vegetation and Grazing Land in Solano County.

Land Type Category	Acres of Land Type	Total % of Region
Urban and Build-Up Land	73,930	18%
Native Vegetation and Grazing Land	63,870	16%
Local and Unique Farmland	53,320	13%
Prime and Statewide Importance Farmland	214,770	53%
Confined Animal Agricultural Land	0	0%
Rural and Semi-Agricultural Land	0	0%
Total	405,890	100%



Most land in the region is in agricultural use, while land use in the Lower Sacramento River area is predominantly urban.



1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations



Regional Flood Management Planning
Lower Sacramento River / Delta North
General Land Use

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FloodSAFE
 CALIFORNIA DEPARTMENT OF WATER RESOURCES
 Prepared By: K. Miller
 Date: May 10, 2013
MAP 6
 File: Z:\Projects\109146\Map06_LandUse.mxd

Map 7 – Local Maintaining Agencies

This map illustrates the various maintaining agencies within the Lower Sacramento River/Delta North Flood Management Planning Region. Maintaining agencies may be any city, county, district or other political subdivision of the State that is authorized to maintain levees. The California Department of Water Resources (DWR) maintains levees pursuant to California Water Code (CWC) Sections 8361 and 12878, and in that capacity is considered a maintaining agency. Inspection reports on the conditions of levees and/or other facilities such as channels, structures, and pump stations are briefly described below.

Local Maintaining Agency Annual Report for Levees of the State Plan of Flood Control – California Water Code Sections 9140-9141

DWR prepares the Local Maintaining Agency (LMA) Annual Report annually for the Central Valley Flood Protection Board (CVFPB) to meet the requirements of California Water Code (CWC) Section 9141.

LMAs submit specific information to DWR by September 30 of each year regarding the levees they operate and maintain. According to CWC Section 9140, the information submitted to DWR shall include all of the following five items:

1. Information known to the LMA that is relevant to the condition or performance of the Project Levee
2. Information identifying known conditions that might impair or compromise the level of flood protection provided by the Project Levee
3. A summary of the maintenance performed by the LMA during the previous fiscal year
4. A statement of work and estimated cost for operation and maintenance of the Project Levee for the current fiscal year, as approved by the LMA
5. Any other readily available information contained in the records of the LMA relevant to the condition or performance of the Project Levee, as determined by the CVFPB or DWR

DWR summarizes the information in a report format and provides the report to the CVFPB by December 31 of each year. Submission of information by LMA includes levee conditions and operation and maintenance activities which are essential for a comprehensive understanding of the flood protection system in the Central Valley. The information presented in this report is also critical to flood control system evaluation and assessment. The reporting status of each LMA for 2012 is presented on the table below.

2012 Inspection Report of the Central Valley State-Federal Flood Protection System

Federal Flood Control Regulations (Title 33 of the Code of Federal Regulations, Section 208.10 (33 CFR 208.10)) require that federal flood protection facilities be inspected at least four times a year — immediately prior to the beginning of the flood season, immediately following each major high water period, and otherwise at intervals not exceeding 90 days. In addition, inspections at intermediate times may be necessary. These periodic inspections are specifically needed to ensure that maintenance measures for project facilities are being effectively carried out, not to determine other inherent problems (geotechnical, flow capacity, etc.) with the project facilities.

The 2012 Inspection Report of the Central Valley State-federal Flood Control System is the annual report on the effectiveness of facility maintenance activities of the maintaining agencies. The report is based primarily on DWR's inspections conducted during the summer and fall of 2012. The overall ratings (see table below) are included for each of the LMAs within the Lower Sacramento River/Delta North Region based on the one of three possible ratings based on the state of its levees:

- Acceptable (A) – No immediate work required, other than routine maintenance. The flood protection project will function as designed and intended with a high degree of reliability, and necessary cyclic maintenance is being performed adequately.
- Minimally Acceptable (M) – One or more deficient conditions exist in the flood protection project that needs to be improved or corrected. However, the project will essentially function as designed with a lesser degree of reliability than what the project could provide.
- Unacceptable (U) – One or more deficient conditions exist that may prevent the project from functioning as designed, intended, or required.

USACE Inspections

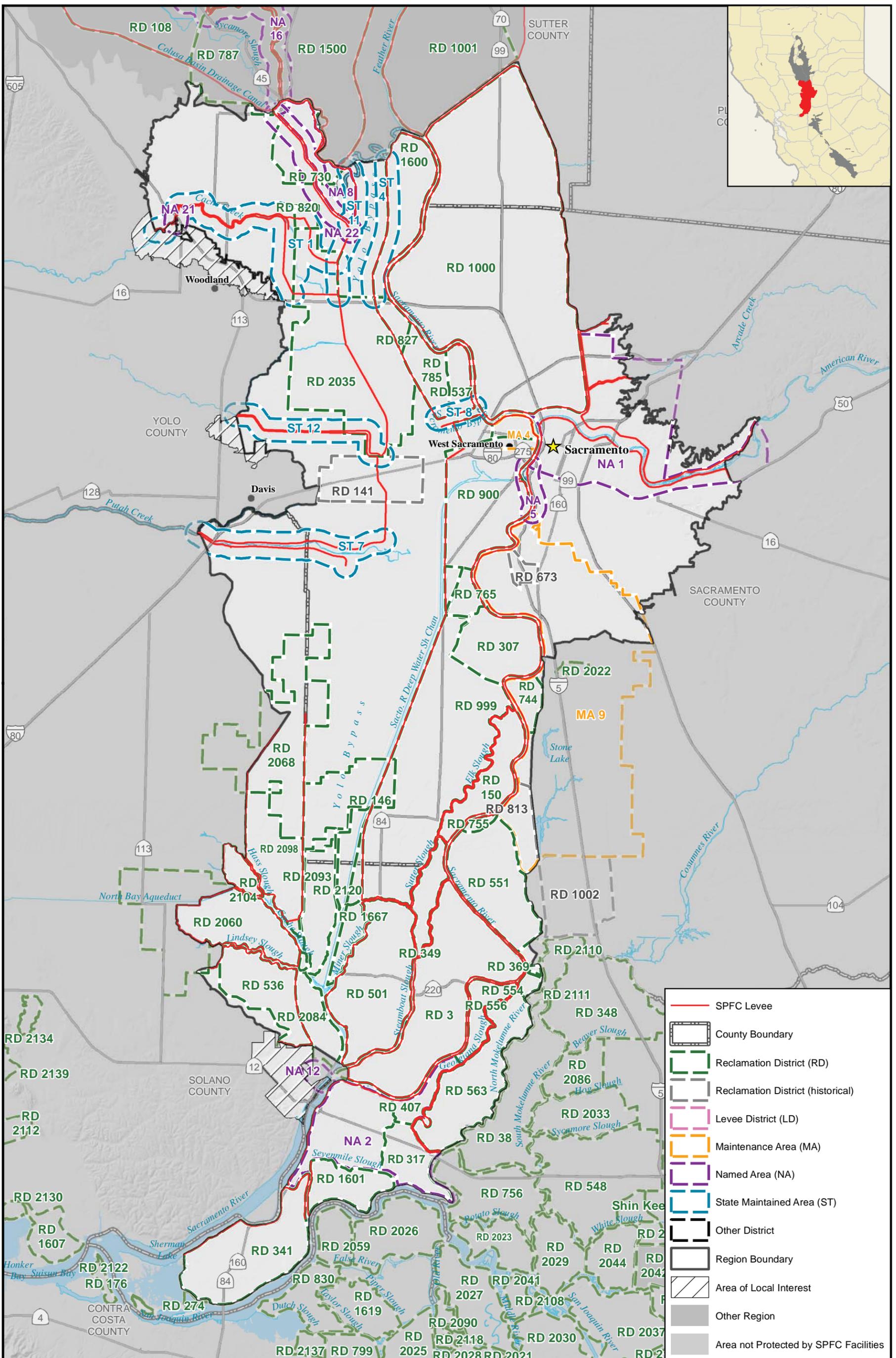
USACE conducts inspections to determine whether federal and nonfederal flood protection facilities meet federal maintenance requirements. This

determination has a major bearing on eligibility for USACE's rehabilitation assistance under Public Law 84-99. There are two types of regular inspections conducted by USACE: routine inspections and periodic inspections. Routine inspections are visual inspections conducted annually to verify that the levee system is being properly operated and maintained. Periodic inspections include a more detailed, comprehensive, and consistent evaluation of the condition of the levee system and are conducted every 5 years by a multidisciplinary team.

SPFC Maintaining Agencies	LMA 2012 Annual Reporting				
	Part 1	Part 2	Part 3	Part 4	Part 5
Agency Name					
Reclamation District No. 537, Lovdal District	✓	✓	✓	✓	No
Reclamation District No. 785, Driver District	✓	✓	✓	✓	✓
Reclamation District No. 827, Elkhorn	✓	✓	✓	✓	✓
Reclamation District No. 900, West Sacramento	✓	No	✓	✓	✓
Reclamation District No. 1000, Natomas	✓	✓	✓	✓	✓
Reclamation District No. 1600, Mull District	✓	✓	✓	✓	No
Reclamation District No. 2035, Conaway Tract	No	No	No	No	No
American River Flood Control District, NA 1	No	No	✓	✓	✓
City Of Sacramento, NA 5	✓	✓	✓	✓	✓
Yolo County Planning and Public Works, NA 21	No	No	No	No	No
DWR Sacramento Maintenance Yard, Maintenance Area 4	✓	No	✓	✓	✓
DWR Sacramento Maintenance Yard, Maintenance Area 9	No	✓	✓	No	✓
DWR Sacramento Maintenance Yard (Statutory)					
Reclamation District No. 3, Grand Island	✓	✓	✓	✓	✓
Reclamation District No. 150, Merrit Island	✓	✓	✓	✓	✓
Reclamation District No. 307, Lisbon	✓	✓	✓	✓	✓
Reclamation District No. 341, Sherman Island	✓	✓	✓	✓	No
Reclamation District No. 349, Sutter Island	✓	✓	✓	✓	✓
Reclamation District No. 369, Libby McNeil	No	No	No	No	No
Reclamation District No. 501, Ryer Island	✓	✓	✓	✓	✓
Reclamation District No. 536, Egbert	✓	✓	✓	✓	✓
Reclamation District No. 551, Pierson	✓	✓	✓	✓	✓
Reclamation District No. 554, Walnut Grove	✓	✓	✓	✓	No
Reclamation District No. 556, Upper Andrus	No	No	No	No	No
Reclamation District No. 563, Tyler Island	✓	✓	✓	✓	✓
Reclamation District No. 755, Randall	✓	No	✓	✓	No
Reclamation District No. No. 765, Glide	No	No	No	No	No
Reclamation District No. 999, Netherlands	✓	✓	✓	✓	✓
Reclamation District No. 1601, Twitchell	✓	✓	✓	✓	✓
Reclamation District No. 2060, Hastings	✓	✓	✓	✓	✓
Reclamation District No. 2068, Yolano	✓	✓	✓	✓	✓
Reclamation District No. 2098, Cache & Haas Slough	✓	✓	✓	✓	✓
Reclamation District No. 2104, Peters Pocket Tract	✓	✓	✓	✓	✓
Brannan Andrus Levee Maintenance District, NA 2	✓	✓	✓	✓	✓
Solano County Public Works, Mellin Levee, NA 12	✓	✓	✓	✓	✓

Other Non-SPFC Maintaining Agencies within the Region are: Reclamation District No. 317, Brannan Andrus Island; Reclamation District No. 407; Reclamation District No. 744; Reclamation District No. 813; Reclamation District No. 1667, Prospect Island; Reclamation District No. 2084, Solano; Reclamation District No. 2093, Liberty Island; and Reclamation District No. 2120, Little Holland.

Contact information for the Local Maintaining Agencies can be found in Directory of Flood Control Officials published by DWR in September 2011. Detailed information, such as facility modification history, Operations and Maintenance Manuals used and financial data, for local agencies that maintain SPFC facilities can be found in the Operations & Maintenance Roles and Responsibilities Technical Memorandum published by DWR in April 2012.



1" = 4 miles
 0 1 2 4 Miles



Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning

**Lower Sacramento River / Delta North
 Local Maintaining Agencies**

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Prepared By: K. Miller
 Date: May 10, 2013

MAP 7

File: Z:\Projects\109146\Map07_LMAs.mxd

Map 8 – Existing Critical Facilities and Economic Assets

Protected assets and their locations often determine the capability of a Region and its special districts ability to respond to emergencies. The location of these protected assets can also impact the potential losses when a disaster occurs. An inventory of the protected assets is shown on this map.

Lower Sacramento River/Delta North Flood Planning Region

Over the last century, the Central Valley has experienced intensive development to meet the needs of a growing population. A complex flood risk management system supports and protects a vibrant agricultural economy, several cities and numerous smaller communities and associated infrastructure. The current SPFC flood control system throughout the Central Valley protects a population of over one-million people and billions of dollars worth of assets that are currently located within flood plains, including major freeways, railroads, airports, water supply systems, utilities, and other public and private infrastructure of significant regional and statewide importance.

The Lower Sacramento River/Delta North Flood Planning Region is rich in these existing assets that are potentially at risk should a flood emergency occur. The Lower Sacramento River/Delta North Flood Management Planning Region consists predominantly of rural agricultural and natural open space areas, but also contains large portions of the City of Sacramento and West Sacramento, as well as several small communities such as Isleton, Walnut Grove, and Clarksburg. Additional rural and urban areas within this region are located near Davis and Woodland.

The Existing Critical Facilities and Economic Assets map indicates existing critical facilities and regional assets identified within the Planning Region, located from various available maps and GIS sources. It is not a complete inventory of all valuable regional assets and facilities, nor is it intended to be. The following list of potential Regional at-risk assets identifies common types of typical assets that may exist, and should be considered, within the Flood Planning Region.

Potential Regional At-Risk Assets

State and Federal Facilities

- State and Federal Highways / Bridges
- Courthouses
- Post Offices
- Prisons
- Military Facilities
- Water Infrastructure
- Canals
- SPFC Levees

Local / County Facilities

- Jails and Detention Centers
- Government Buildings
- Roadways / Bridges
- Transit Centers
- Water / Wastewater facilities
- Airports
- Reservoirs / Aqueducts
- Parks / Zoos
- Local Non-Project Levees

Health and Public Safety

- Hospitals
- Convalescent Facilities
- Medical Facilities / Clinics
- Police
- Fire
- Highway Patrol

Education

- Public Schools
- Libraries
- Colleges / Universities

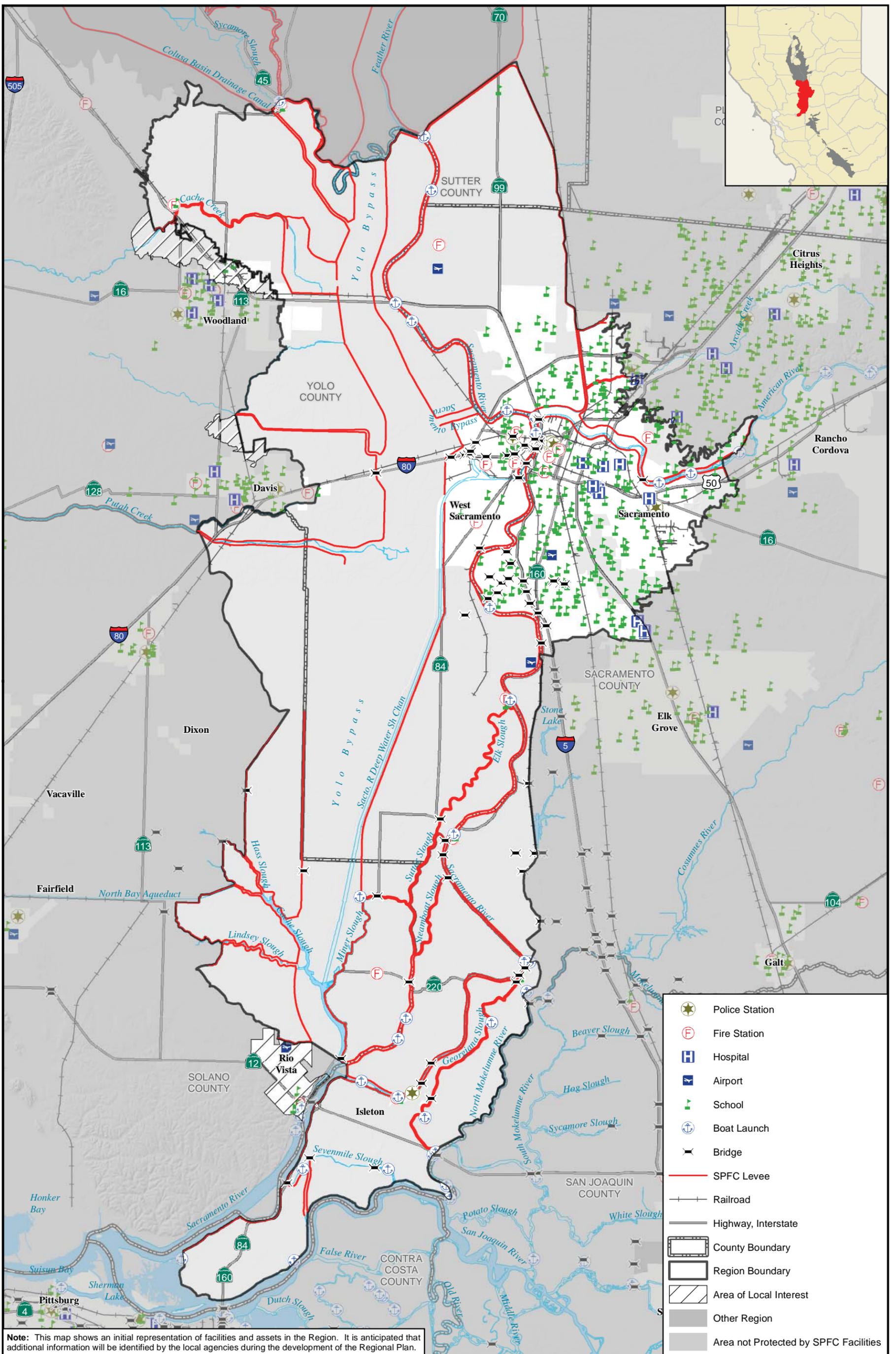
Other Critical Public Assets / Infrastructure

- Bus Terminals
- Railroad Stations
- Railroad Tracks / Yards
- Power Facilities / Substations
- High Voltage Transmission Facilities
- Pipelines
- Stadiums / Arenas / Entertainment Venues
- Regional Shopping Malls
- Hazmat Storage Areas
- Docks / Harbors / Launching Facilities

Note: This map shows an initial representation of facilities and assets in the Region. It is anticipated that additional information will be identified by the local agencies during the development of the Regional Plan.



Power transmission lines cross delta roads and levees



Note: This map shows an initial representation of facilities and assets in the Region. It is anticipated that additional information will be identified by the local agencies during the development of the Regional Plan.

- Police Station
- Fire Station
- Hospital
- Airport
- School
- Boat Launch
- Bridge
- SPFC Levee
- Railroad
- Highway, Interstate
- County Boundary
- Region Boundary
- Area of Local Interest
- Other Region
- Area not Protected by SPFC Facilities

1" = 4 miles

Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North

Existing Critical Facilities and Economic Assets

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 CALIFORNIA DEPARTMENT OF WATER RESOURCES

Prepared By: K. Miller
 Date: May 10, 2013

MAP 8

File: Z:\Projects\109146\Map08_ExistingAssets.mxd

Map 9 – SPFC and Local Flood Control Facilities

The Lower Sacramento River/Delta North Flood Management Planning Region contains a number of flood control facilities both locally owned and operated as well as State owned and operated through the State Plan of Flood Control (SPFC). The main purpose of these facilities is to control storm water runoff and protect the local population in the region from flood risks. The SPFC facilities also serve the purposes of creating hydroelectric power and managing and conveying the State's potable water supply. SPFC facilities in the region are listed and briefly explained below. More information about the facilities can be found in the State Plan of Flood Control Descriptive Document (November 2010). Information on local flood control facilities may be provided by local entities during the regional flood management planning process.

Willow Slough Weir – Located on the Willow Slough in Yolo County, this weir is seated at the bifurcation point for water from the original water course, to the relocated man-made bypass channel which conveys it to the Yolo Bypass. Relocating the water from Willow Slough protects the City of Davis from flooding.

Cache Creek Settling Basin – Located along the Yolo Bypass near Cache Creek, this settling basin is an area where water from Cache Creek collects before entering the Yolo Bypass flood control feature. Allowing water to settle controls flow rates and reduces sediment transport into the Yolo Bypass. This helps to maintain the flood conveyance integrity of the Yolo Bypass.

Sacramento Weir – Located at the confluence of the Sacramento and American Rivers, this structure is a series of weirs which allow excess water in the river to escape into the Yolo Bypass. A weir is a structure which controls the hydraulic energy of flowing water from the river into the bypass. Acting as a barrier for water within the river, the weir is designed to alter the flow characteristics of the water. Water behind the weir is released slowly once the water level has risen to the top of the weir barrier. The weir is a low point where water can escape the river. This reduces the pressure on river levees. This weir requires manual operation for flow release and is composed of 48 sections, each 38 feet wide.

Yolo Bypass – Located between Yolo and Sacramento Counties, south of the Fremont Weir, this bypass protects Sacramento and other riverside communities from flooding through a series of weirs. The weirs connect the bypass to the Sacramento Bypass as well as various local creeks. The bypass is an area of land where excess flood waters in the surrounding rivers and creeks can be diverted to prevent flooding in riverside communities. The Yolo Bypass conveys water to the Delta.

Pump Stations along American River – Located west and north of the Sacramento Weir, pump stations are used to supply water and drain low lying land. Water can be led into and out of the Yolo Bypass by pumping to either protect against flooding or supply agricultural irrigation during the dry season.

Fremont Weir – Located just south of Knights Landing Outfall Structure at the junction of the Sacramento River and the joint Feather River/Sutter Bypass channel, the Fremont Weir controls the hydraulic energy of flowing water from the Sacramento River, Sutter Bypass, and Feather River as it enters into the Yolo Bypass. Acting as a barrier for water within the bypass, the weir is designed to alter the flow characteristics of the water as it passes over the weir. Water pools behind the weir and is released slowly once the water level has risen to the top of the barrier. Altering the hydraulic energy of the flowing water can prevent damage to the flood control system downstream.

Sacramento Deep Water Ship Channel – The Sacramento River Deep Water Ship Channel is not part of the SPFC and is maintained by USACE. The ship channel extends approximately 43 miles from the Port of Sacramento to New York Slough, thereby affording access from the Port of Sacramento to Bay Area harbors and the Pacific Ocean.

Outside of Region

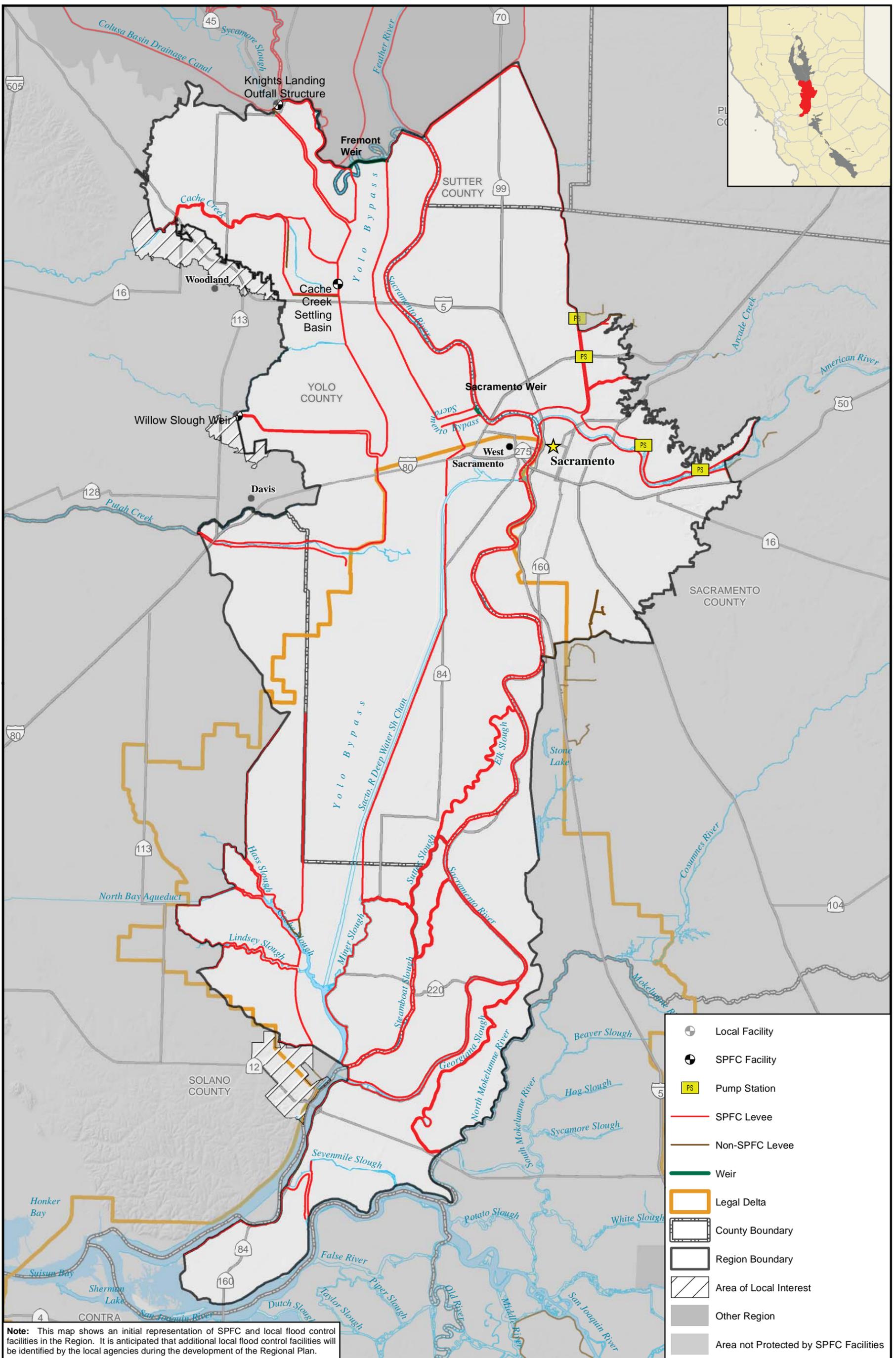
Knights Landing Outfall Structure – Located at the intersection of the Sacramento River and Sycamore Slough, this outfall structure consists of gates which control the amount of water which enters the main drainage channel of Colusa Basin from the Sacramento River. They are sometimes called Sycamore Slough Outfall Gates. The outfall structure consists of a concrete slab foundation having a long center section with abutments and wing walls on each side. The abutments close and open to let a smaller or larger amount of water through. The gates protect the lower Colusa Drainage Basin from backwater of the Sacramento River. The gates also assist with agricultural irrigation during the dry season.

Nelson Bend Rockweir – Located at the intersection of the Sutter Bypass and Feather River, this rockweir controls the hydraulic energy of flowing water from the river into the bypass. Acting as a barrier across the river, the weir is designed to alter the flow characteristics of the water. Water pools behind the weir and is released slowly once the water level has risen to the top of the barrier. Altering the hydraulic energy of the flowing water can prevent damage to the flood control system downstream.

Sutter Bypass and Pump Stations – Three pump stations are located along the Sutter Bypass. Specifically, one is located west of the Tisdale Weir, one on the northerly end of the bypass, and one on the southerly ends of the bypass. A pump station is used to supply water to the canal and drain low lying land. Water can be led into and out of the bypass by pumping. Water is pumped into the bypass during flood season and pumped out of the bypass for irrigation during the dry season.



Fremont Weir



Note: This map shows an initial representation of SPFC and local flood control facilities in the Region. It is anticipated that additional local flood control facilities will be identified by the local agencies during the development of the Regional Plan.

1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
SPFC and Local Flood Control Facilities
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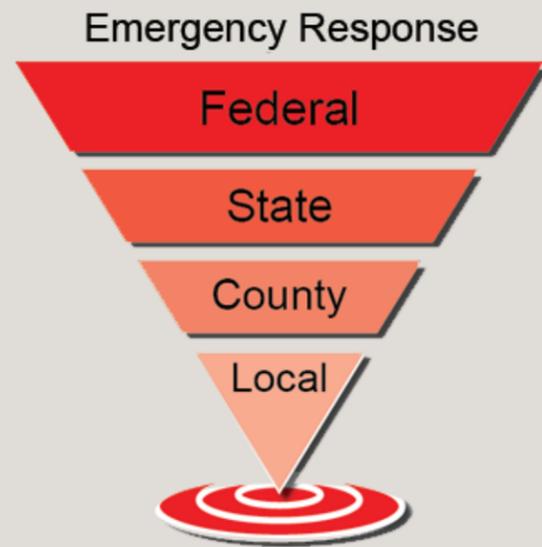

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 Prepared By: K. Miller
 Date: May 10, 2013
MAP 9
 File: Z:\Projects\109146\Map09_SPFCLocalFloodCtrl.mxd

Map 10 – Flood Emergency Response Facilities

Critical Emergency Response facilities and their locations often determine the capability of a region and its special districts ability to respond to emergencies. The location of these critical facilities can also impact the potential losses when a disaster occurs. An inventory of the critical emergency response facilities is shown on this map. (FloodER red triangle graphic is shown here)

As set forth in the California Government Code, the California Public Contract, the California Water Code, and the State Emergency Plan, the Department of Water Resources is the lead State agency for responding to flood emergencies; however every emergency begins at the local level and timely coordination of response efforts is critical to saving lives, property, and the environment. Emergency response planning provides a guide to Local Maintaining Agencies (LMA), Operational Areas (OA), and Department of Water Resources (DWR) for addressing flood threats as quickly as possible using the Standardized Emergency Management System (SEMS) and the Incident Command System (ICS). It is vital that local and county agencies follow SEMS and ICS protocols for addressing threats at the local level and have complete up-to-date emergency action plans that:

- Streamline communications (contact information, call tree, radio frequencies, protocols)
- Provide preparation and activation protocols
- Identify Emergency Operation Center locations
- Provide a management structure for emergency work
- Provide protocols for prioritizing actions
- Direct resources effectively during an emergency



- Provide locations and procedures to obtain necessary resources (i.e., equipment, materials, manpower)
- Identify critical sites or problem areas that need special attention
- Identify critical infrastructure
- Provide an evacuation plan and rally points
- Include training and exercise schedule

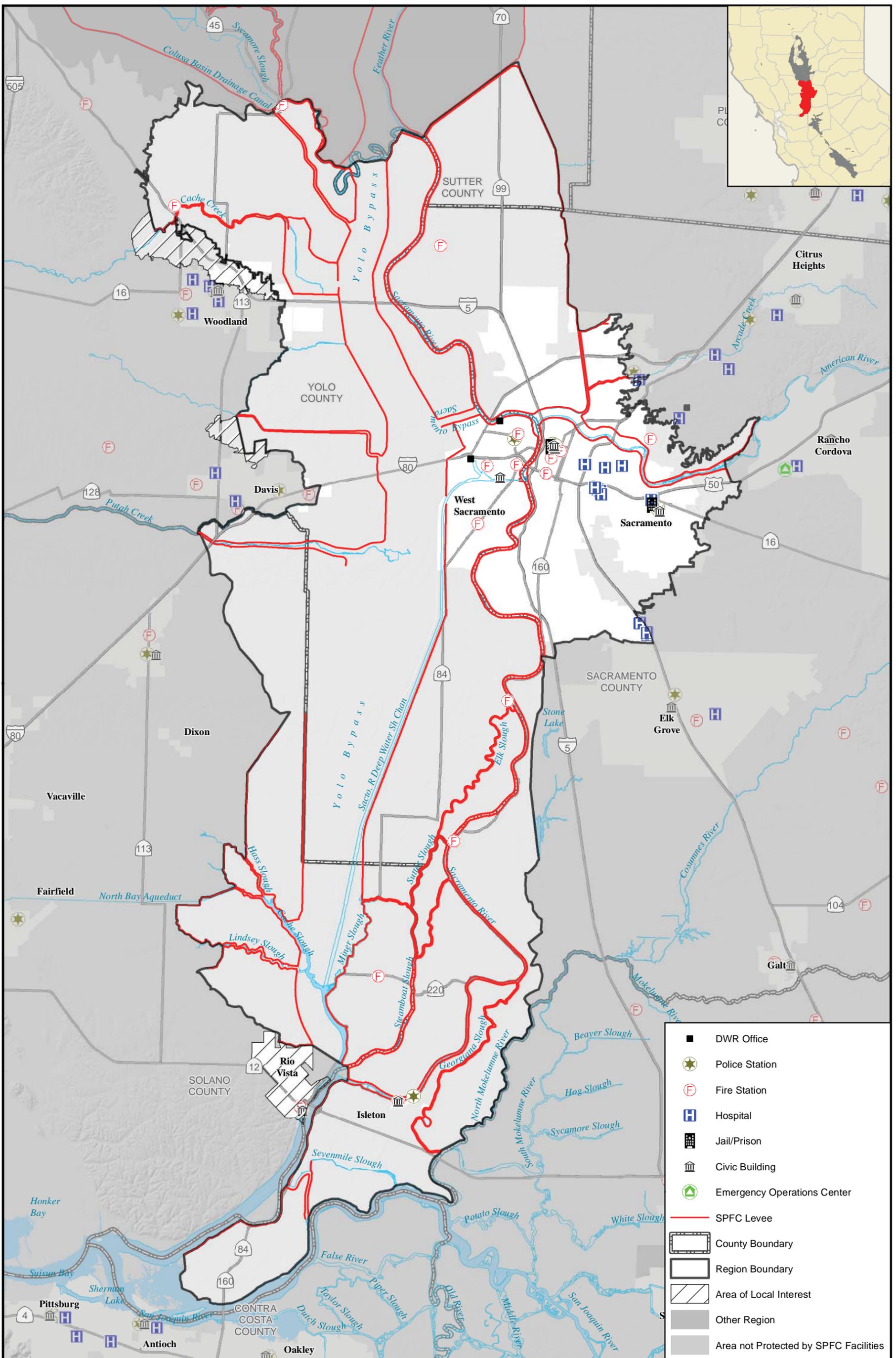
LMA Emergency Action Plans support County level emergency response plans and need to be included in the flood hazard component of a Multi-Hazard Mitigation (MHM) Plan. The contact information for Flood Emergency Managers in the Lower Sacramento River/Delta North region is provided below. More local contact information can be found in the Directory of Flood Officials.

OA (County Agency)	Emergency Contact #	Address	MHM Plan contains flood hazard component
Sacramento County Emergency Services	916-875-5000	3720 Dudley Blvd, Suite 122, McClellan, CA 95652	Yes
Solano County Emergency Services	707-784-1600	530 Clay Street, Fairfield, CA 94533	Yes Lower Sac/No Delta North
Sutter County Emergency Services	530-822-7400	1130 Civic Center Blvd, Yuba City, CA 95993	Yes
Yolo County Emergency Services	530-406-4930	120 West Main Street, Suite E, Woodland, CA 95695	Yes
State Agency	Emergency Contact #	Address	
DWR Flood Operations Center	916-574-2619	3310 El Camino Ave, Suite 200, Sacramento, CA 95821	
Cal EMA Inland Region	916-845-8911	3650 Schriever Ave, Mather, CA 95655	

DWR does not declare emergencies, order or coordinate evacuations, or coordinate shelters. DWR supports local flood emergency response by providing real-time weather and hydrology conditions and warnings, technical assistance, information dissemination, and flood fight resources through specific requests from California Emergency Management Agency (CalEMA) Operational Areas.



Twitchell Island maintenance yard preparing for emergency response



1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
Flood Emergency Response Facilities
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MAP 10
 File: Z:\Projects\109146\Map10_FloodER.mxd

Map 11 – Overall Levee Conditions

The overall physical condition of SPFC levees is shown on this map. It includes a simplified representation of levee conditions, based on Urban Levee Evaluations (ULE) and Non-Urban Levee Evaluations (NULE) results that are not directly comparable because different evaluation methodologies were used for each project. The map is intended to show broadly which levee reaches are of relatively higher, medium, and lower concern, based on physical conditions of the levees. Levees shown as purple (higher concern) on the map generally display more performance problems than those shown in green (lower concern). Results do not reflect economic or life safety consequences of flooding, which are key factors in planning system repairs and improvements.

Levee Status Factors were evaluated in the Flood Control System Status Report (FCSSR) according to the following status factors:

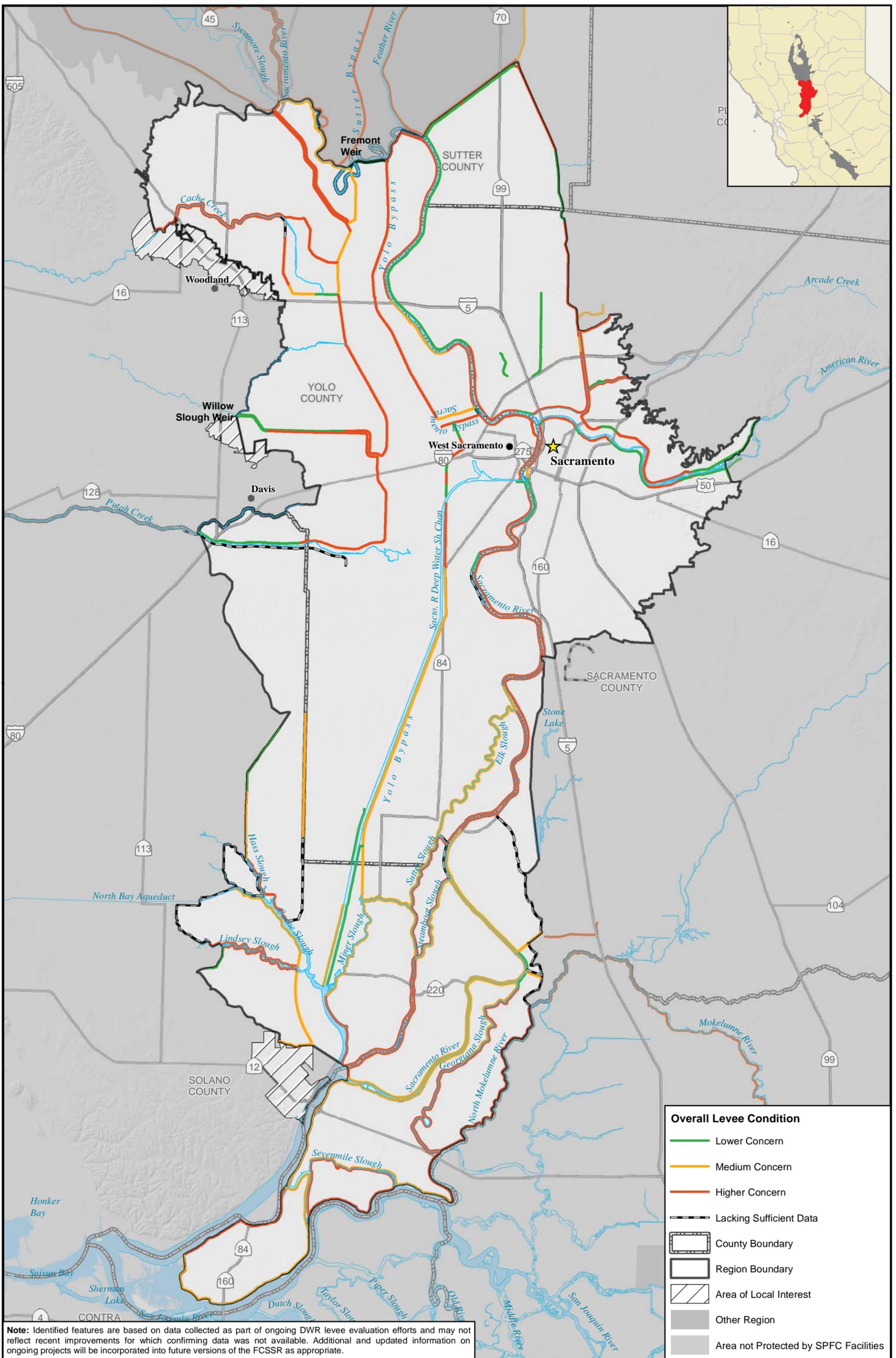
- Inadequate Levee Geometry (Levee Geometry Check) – Levee crest elevations that are too low, crest widths that are too narrow, and levee side slopes that are too steep can reduce levee stability and lead to failure.
- Seepage – Seepage under a levee foundation or through a levee can reduce levee stability and lead to failure.
- Structural Instability – Slides, sloughs, slope depressions or bulges can reduce levee stability and lead to failure.
- Erosion – Levee and bank erosion can directly reduce levee cross sections and shorten seepage paths, leading to failure.

- Settlement – Levee settlement or land subsidence over years can result in levee crest elevations lower than designed, reducing freeboard or causing water to overtop a levee.
- Penetrations – Irrigation and drainage pipes, utilities, and other structures through levees may create seepage paths. Seepage along the penetrations, or through deteriorating penetrations, could wash away levee material and lead to failure. Lack of positive closure devices on pipes penetrating levees can also lead to localized flooding.
- Levee Vegetation – Vegetation on levees can interfere with floodfighting efforts and maintenance by reducing visibility and accessibility. The extent that levee vegetation impacts levee integrity is the subject of ongoing research.
- Rodent Damage – Burrowing animals can create holes in levees that can create seepage paths and lead to levee failure.
- Encroachments – Encroachments (such as debris, fences, and structures) on SPFC facilities can interfere with floodfighting efforts and maintenance and, in some cases, reduce levee stability, which can lead to levee failure.

Note: Identified features are based on data collected as part of ongoing DWR levee evaluation efforts and may not reflect recent improvements for which confirmed data was not available.



The overall physical condition of SPFC levees is based on Urban Levee Evaluations and Non-Urban Levee Evaluations, and inspections completed by Local Maintaining Agencies (LMA's) and DWR



Note: Identified features are based on data collected as part of ongoing DWR levee evaluation efforts and may not reflect recent improvements for which confirming data was not available. Additional and updated information on ongoing projects will be incorporated into future versions of the FCSSR as appropriate.

Overall Levee Condition

- Lower Concern
- Medium Concern
- Higher Concern
- Lacking Sufficient Data
- County Boundary
- Region Boundary
- Area of Local Interest
- Other Region
- Area not Protected by SPFC Facilities

1" = 4 miles

Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North

Overall Levee Conditions

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MAP 11

File: Z:\Projects\109146\Map11_Hazard_overall.mxd

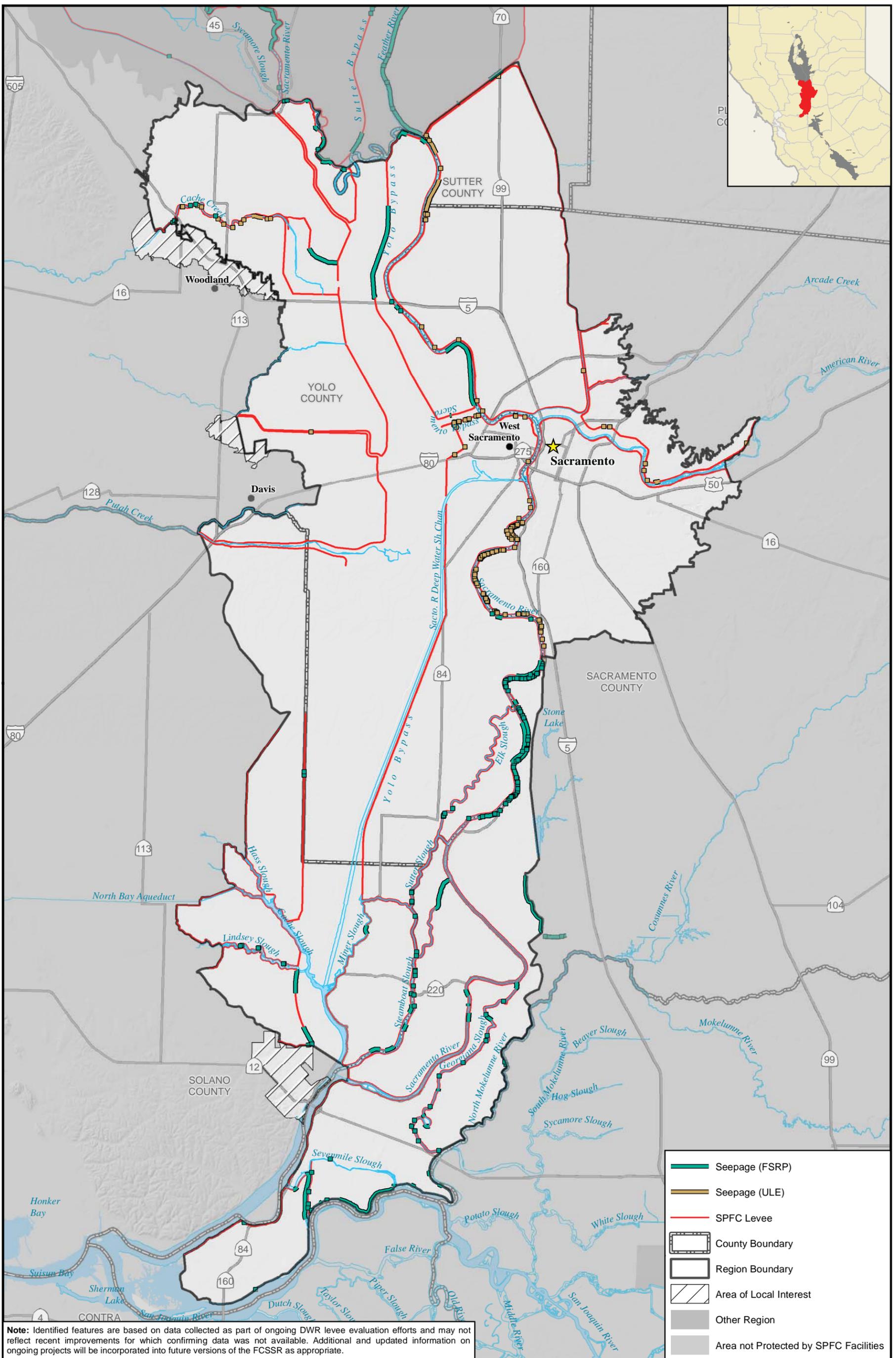
Map 12 – Seepage Past Performance Problems

This map shows the seepage past performance problems based on information collected as part of ongoing DWR levee evaluation efforts, Urban Levee Evaluation (ULE) program and the Flood System Repair Program

(FSRP), and may not reflect recent improvements for which confirming data was not available. This information was originally presented in the *Flood Control System Status Report (FCSSR)* (December 2011).



An example of seepage



Note: Identified features are based on data collected as part of ongoing DWR levee evaluation efforts and may not reflect recent improvements for which confirming data was not available. Additional and updated information on ongoing projects will be incorporated into future versions of the FCSSR as appropriate.

1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
Seepage Past Performance Problems
DRAFT

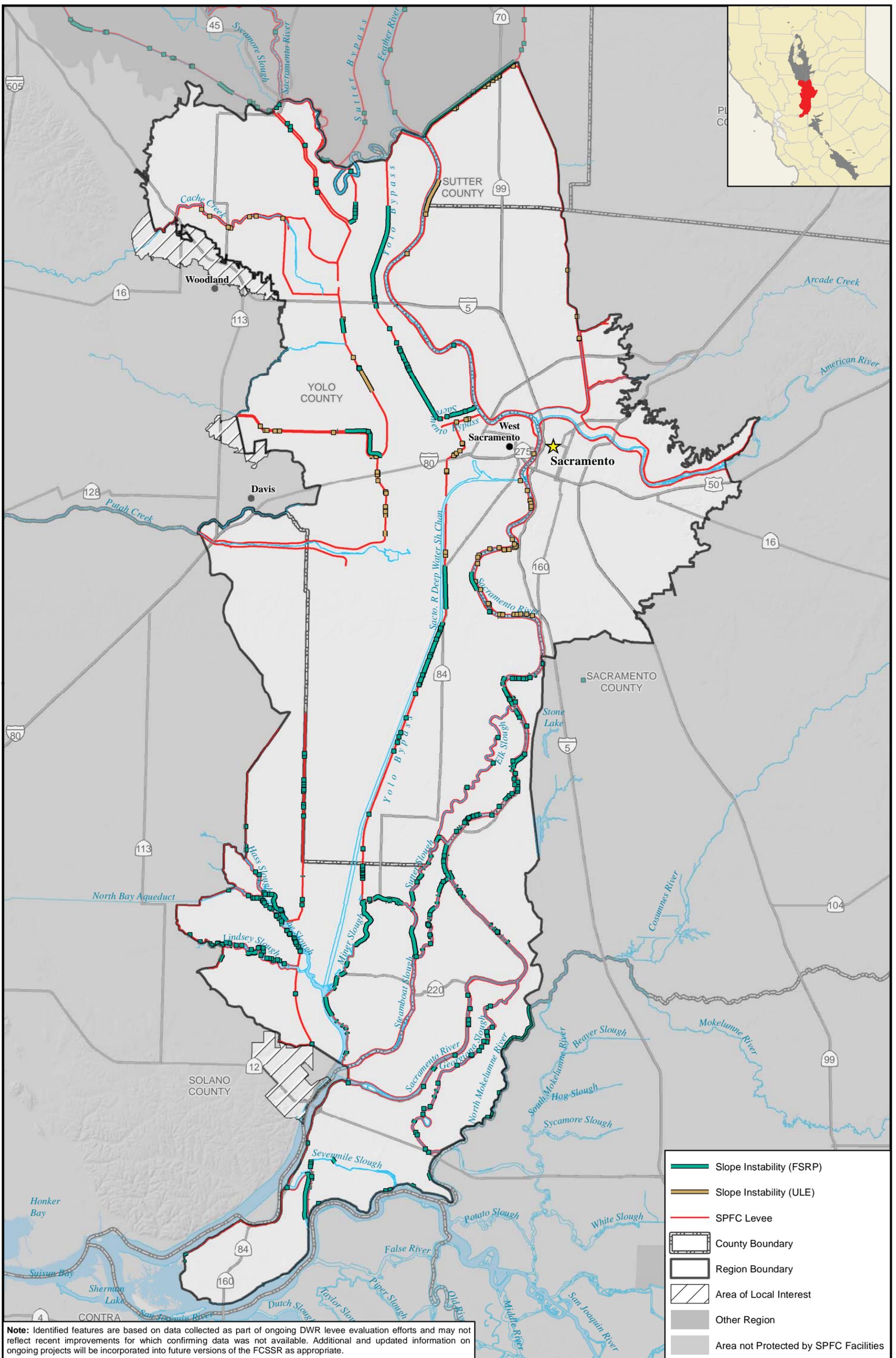

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 STATE OF CALIFORNIA
 Prepared By: K. Miller
 Date: May 10, 2013
MAP 12
 File: Z:\Projects\109146\Map12_Seepage.mxd

Map 13 – Slope Instability Past Performance Problems

This map shows the slope instability past performance problems based on information collected as part of ongoing DWR levee evaluation efforts, Urban Levee Evaluation (ULE) program and the Flood System Repair Program (FSRP), and may not reflect recent improvements for which confirming data was not available. This information was originally presented in the *Flood Control System Status Report (FCSSR)* (December 2011).



An example of slope instability



- Slope Instability (FSRP)
- Slope Instability (ULE)
- SPFC Levee
- County Boundary
- Region Boundary
- Area of Local Interest
- Other Region
- Area not Protected by SPFC Facilities

Note: Identified features are based on data collected as part of ongoing DWR levee evaluation efforts and may not reflect recent improvements for which confirming data was not available. Additional and updated information on ongoing projects will be incorporated into future versions of the FCSSR as appropriate.

1" = 4 miles

0 1 2 4 Miles

Datum: NAD 83 Projection: CA (Teale) Albers
Zone: N/A Units: meters

Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North

Slope Instability Past Performance Problems

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Date: May 10, 2013

MAP 13

File: Z:\Projects\109146\Map13_SlopeInstability.mxd

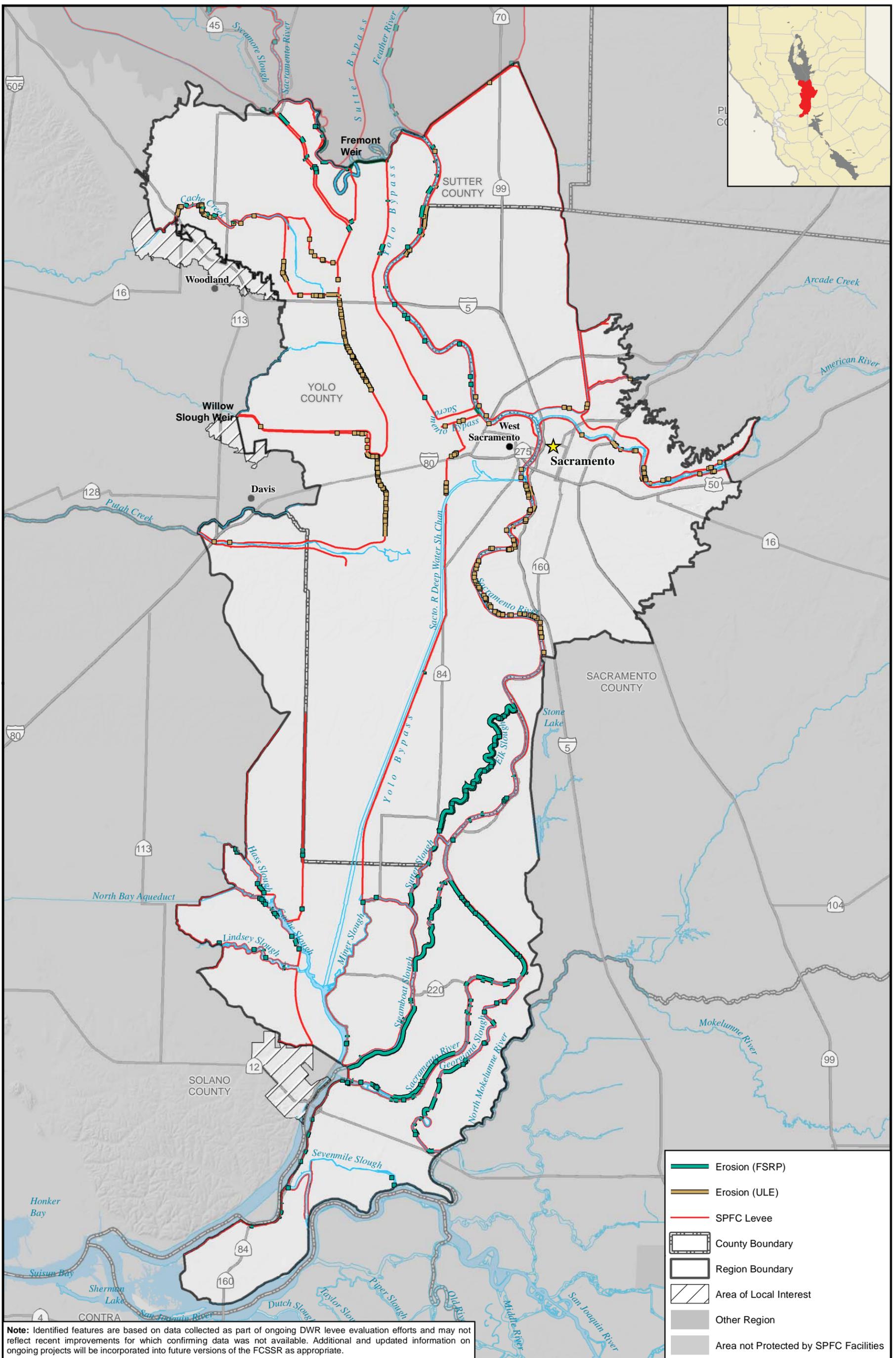
Map 14 – Erosion Past Performance Problems

This map shows the erosion past performance problems based on information collected as part of ongoing DWR levee evaluation efforts, Urban

Levee Evaluation (ULE) program and the Flood System Repair Program (FSRP), and may not reflect recent improvements for which confirming data was not available. This information was originally presented in the *Flood Control System Status Report (FCSSR)* (December 2011).



An example of erosion



1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
Erosion Past Performance Problems
DRAFT

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 Prepared By: K. Miller
 Date: May 10, 2013
MAP 14
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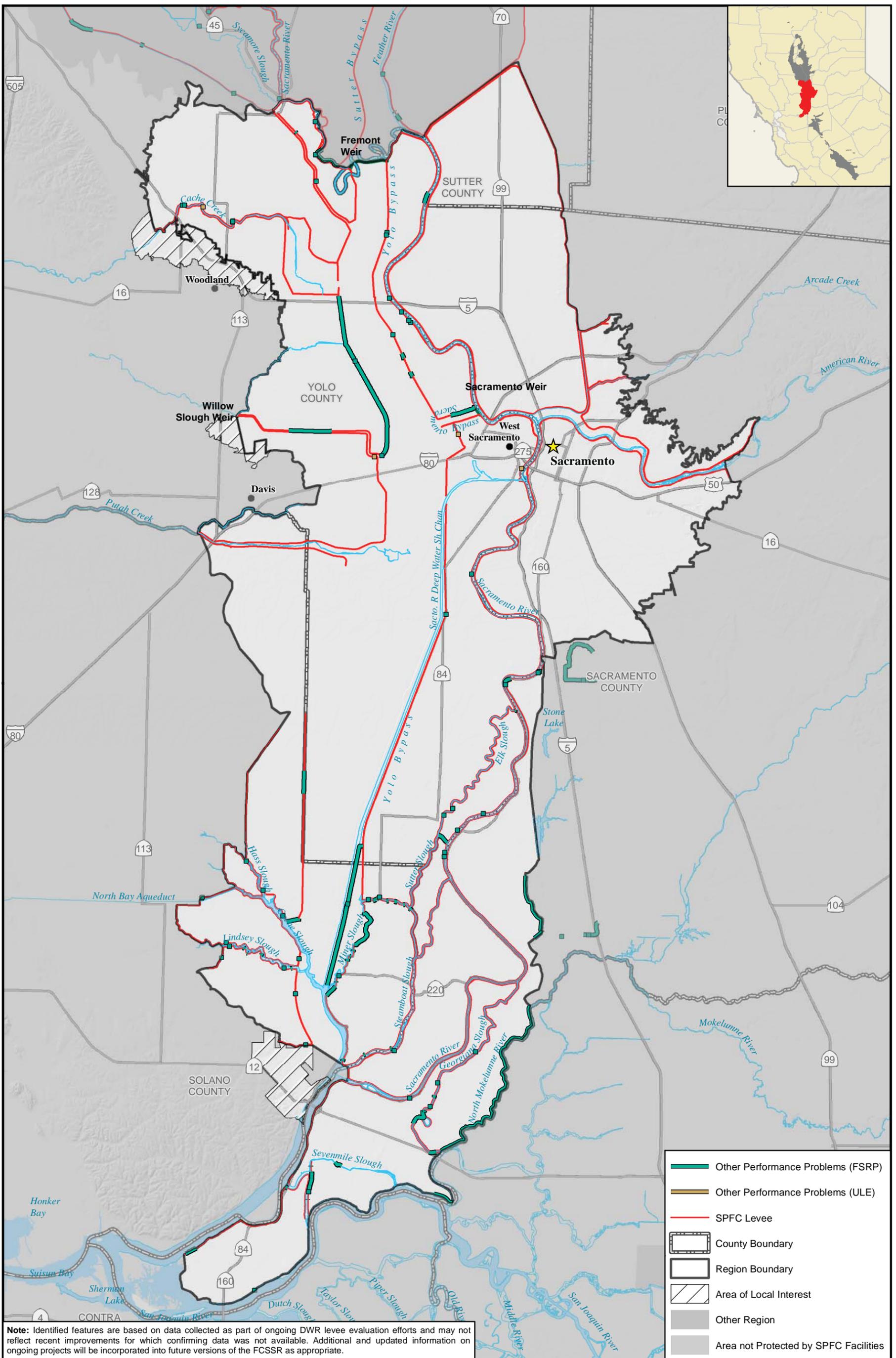
Map 15 – Other Past Performance Problems

This map shows information collected, outside of seepage, levee stability, and erosion issues, as part of ongoing DWR levee evaluation efforts, Urban Levee Evaluation (ULE) program and the Flood System Repair Program (FSRP).

The “other” performance problem category generally includes – historical overtopping, breach occurrences, relief cuts, subsidence, burrows, and anthropogenic damage. This data may not reflect recent improvements for which confirming data was not available. This information was originally presented in the *Flood Control System Status Report (FCSSR)* (December 2011).



An example of a levee breach



Note: Identified features are based on data collected as part of ongoing DWR levee evaluation efforts and may not reflect recent improvements for which confirming data was not available. Additional and updated information on ongoing projects will be incorporated into future versions of the FCSSR as appropriate.

- Other Performance Problems (FSRP)
- Other Performance Problems (ULE)
- SPFC Levee
- County Boundary
- Region Boundary
- Area of Local Interest
- Other Region
- Area not Protected by SPFC Facilities

1" = 4 miles

0 1 2 4 Miles

Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters

Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North

Other Past Performance Problems

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Prepared By: K. Miller
 Date: May 10, 2013

MAP 15

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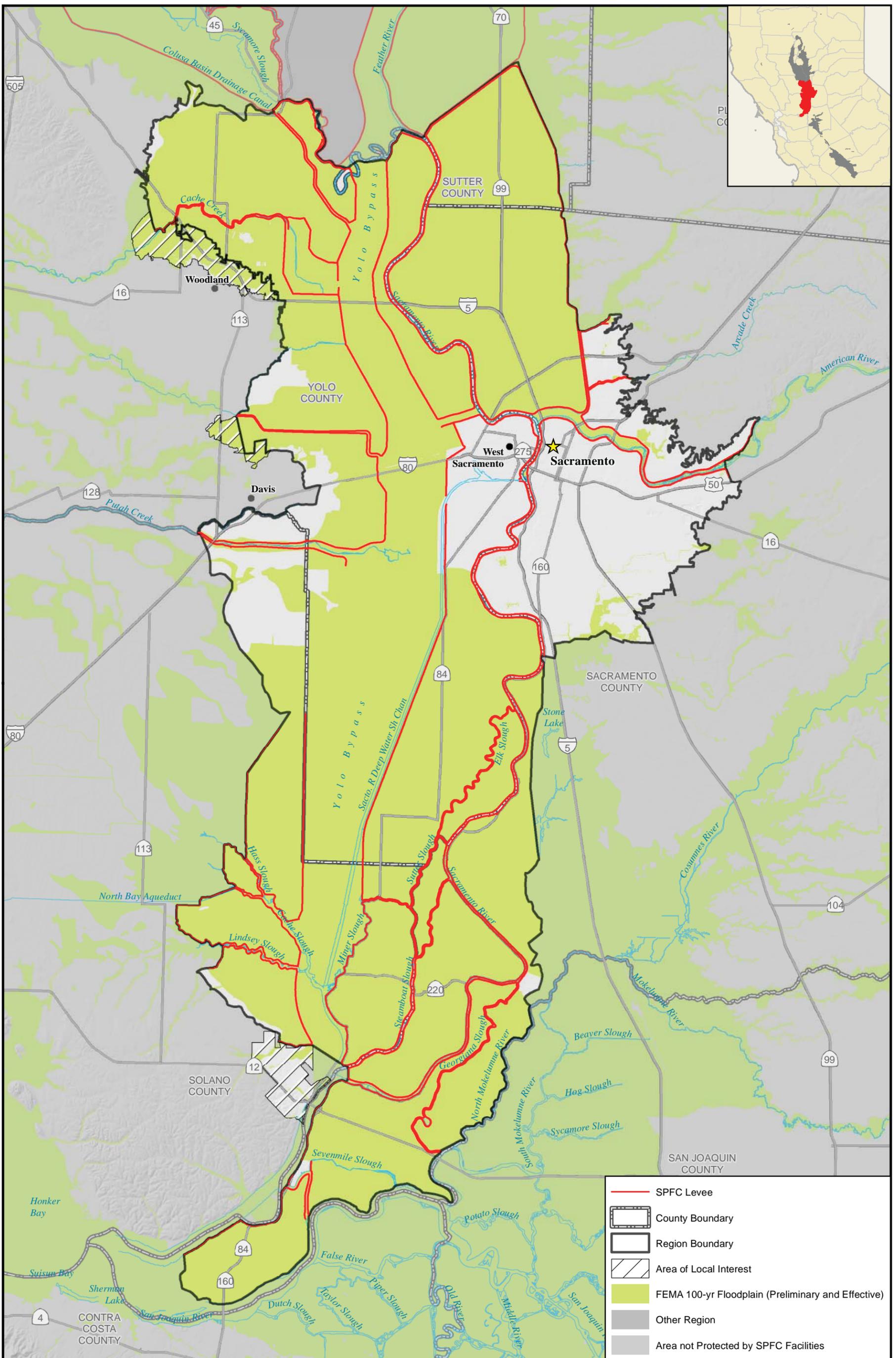
Map 16 – FEMA 100-Year Floodplain

FEMA flood zones are geographic areas that the Federal Emergency Management Agency (FEMA) has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map (FIRM). The FEMA 100-year floodplain represents the flood zones that are

subject to flooding from the 1% annual chance flood. The FEMA 100-year floodplains were obtained from FEMA in February 2013. For the latest floodplain information, please visit FEMA's Map Service Center at <http://msc.fema.gov/>. The FEMA effective floodplains are shown on FEMA's Effective Flood Insurance Rate Maps and used for regulatory purposes.



Storm event of January 1, 2006, Twitchell Island



1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations



Regional Flood Management Planning
Lower Sacramento River / Delta North
FEMA 100-Year Floodplain

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Prepared By: K. Miller		MAP 16
Date: May 10, 2013		
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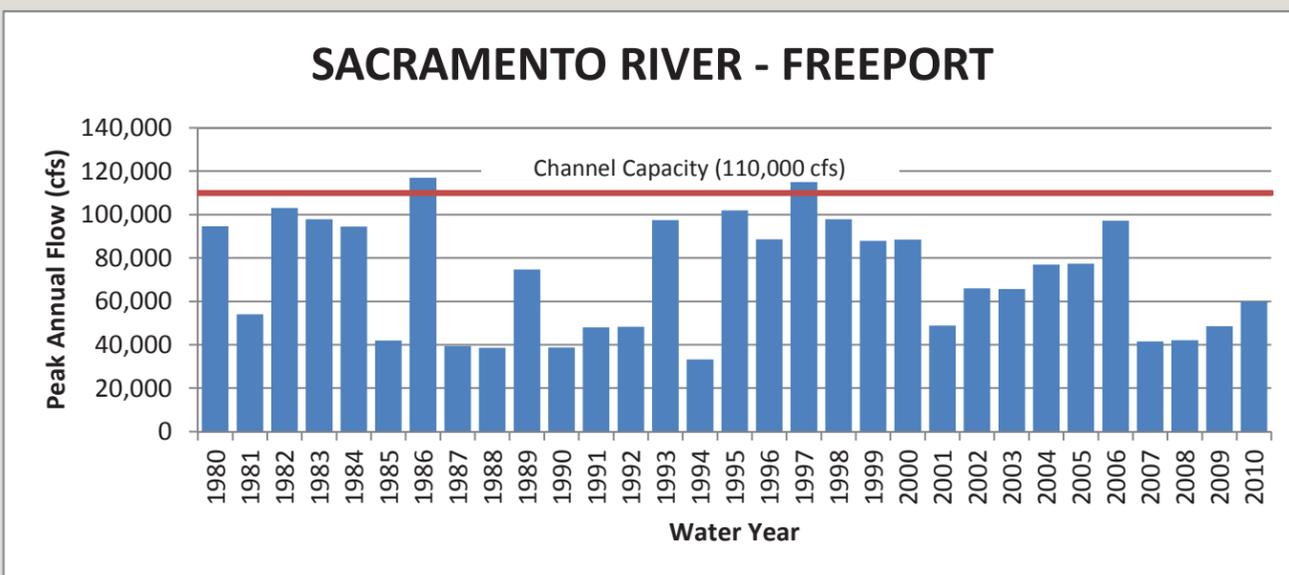
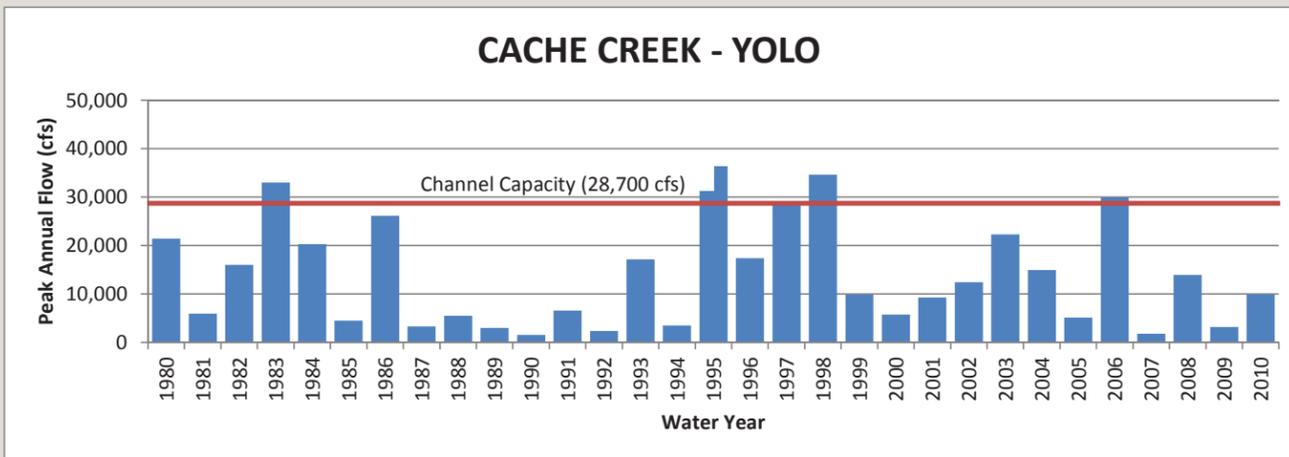
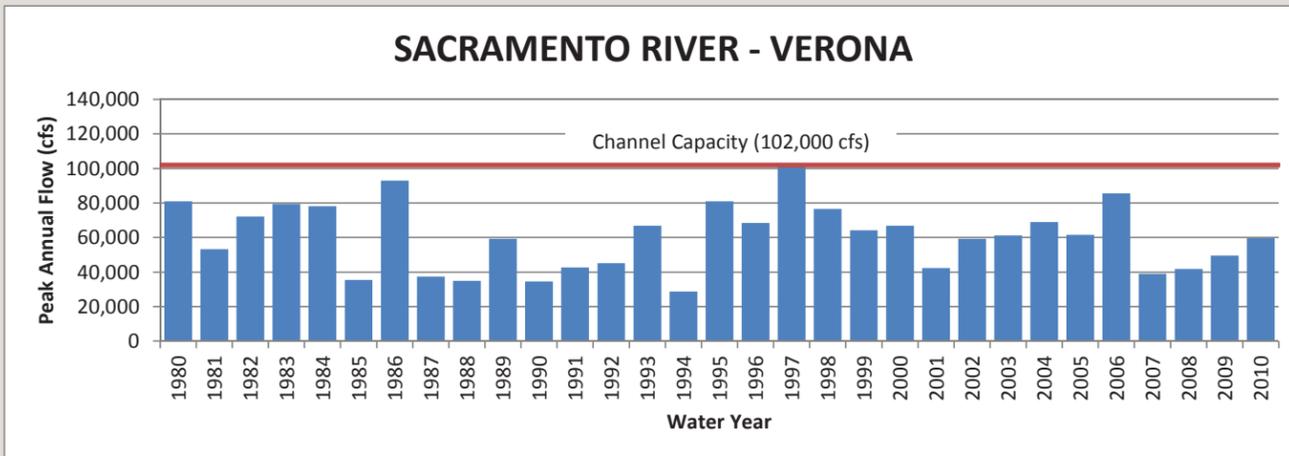
Map 17 – Channel Capacities and Flood Forecast Monitoring Network

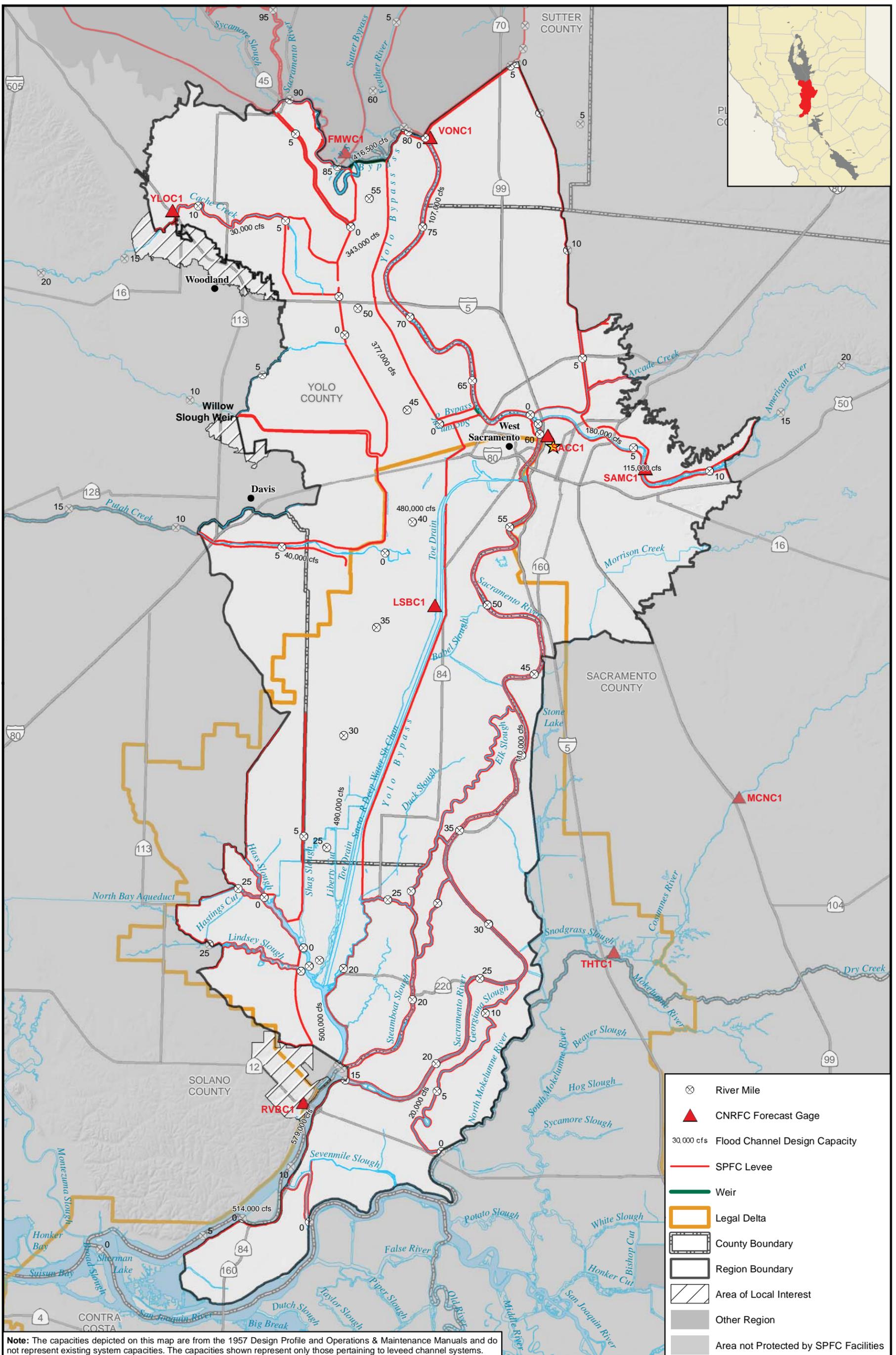
Conveyance capacity is defined as the maximum rate of flowing water, usually expressed in cubic feet per second (cfs), that a river, canal, or bypass can carry without exceeding a threshold value such as flood discharge, or without using the freeboard distance from the top of a levee.

Design Channel Capacity - Design channel capacities were calculated from the design profiles based on steady-state, uniform flow hydraulic computations of historical floods using data available at the time. Therefore, design channel capacities were based on a very limited hydrological record, were highly dependent on the boundary conditions assumed, and did not consider variations in flow and depth with respect to time and distance. Furthermore, the design profiles could not account for changes in vegetation and sedimentation patterns within the channels, or flood system improvements that have taken place after the historical floods used to derive the design flood flow capacities. For example, the 1955 historical flood used to determine the 1955 design profile for the San Joaquin River downstream from the Merced River confluence occurred before construction of the San Joaquin River bypass system.

Flood Monitoring Network - Under the authority of the California Water Code Section 236, the River Forecasting Section works with the National Weather Service’s California-Nevada River Forecast Center (CNRFC) to provide year-round daily forecasts of reservoir inflows, river flows, and water levels throughout California and in parts of Nevada. These forecasts are used by the Flood Operations Branch and the National Weather Service to determine the level of joint Federal-State flood response activation and operations. During high water events, Federal and State river forecasters work around the clock to update their forecasts and monitor real-time changes in California and Nevada’s larger rivers and estuaries.

Gages are located throughout the Sacramento and San Joaquin River Systems. The peak annual flow is shown for selected gages for the 1980 to 2010 period where historical flow data was readily available. In the Lower Sacramento River/Delta North Region the peak annual flows at the Sacramento River-Verona, Cache Creek-Yolo, and Sacramento River – Freeport are shown in the bar charts below.





Note: The capacities depicted on this map are from the 1957 Design Profile and Operations & Maintenance Manuals and do not represent existing system capacities. The capacities shown represent only those pertaining to leveed channel systems.

1" = 4 miles

Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations

Regional Flood Management Planning
Lower Sacramento River / Delta North
Channel Capacities and Flood
Forecast Monitoring Network

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FloodSAFE
 CALIFORNIA

DEPARTMENT OF WATER RESOURCES
 STATE OF CALIFORNIA

Prepared By: K. Miller
 Date: May 10, 2013

MAP 17

File: Z:\Projects\109146\Map17_ChannelCapacities.mxd

Map 18 – Managed Environmental Lands

This map shows the extent of lands that are currently being managed by federal, State, or private entities. The current mapped information is listed below:

- National Wildlife Refuge, USFWS, 2011.
 - » Description from metadata: "This data layer depicts the simplified boundaries of lands and waters administered by the U.S. Fish and Wildlife Service (USFWS) in North America, U.S. Trust Territories and Possessions. It includes only lands that are held by fee or secondary title by USFWS. The primary source for this information is the USFWS Realty program."
- Department of Fish & Game Lands, DFG, 2011.
 - » This layer includes all of DFG (now Department of Fish and Wildlife) Owned and Operated Lands. These are only lands owned with fee title. The only lands shown on Map 13 are those designated as "Ecological Reserve" or "Wildlife Area".
- The Nature Conservancy Lands, TNC, 2011.
 - » Description from metadata: "A spatial dataset of lands and waters that The Nature Conservancy has a legal interest in (such as a conservation easement or fee-simple ownership). Includes spatial data from TNC's Conservation Lands System (CLS) database, which is the legal database of record for all TNC land transactions (fee, easement, lease and deed restrictions)."

Lower Sacramento River/Delta North Region Managed Environmental Lands

Managed Land Type	Area (square miles)	Acres
National Wildlife Refuge (USFWS)	<1	7
Department of Fish and Wildlife Lands	29	18,266
The Nature Conservancy Lands	0	0

Described managed lands are those lands located within the region or adjacent to the region.

Calhoun Cut Ecological Reserve

The Calhoun Cut Ecological Reserve, managed by the California Department of Fish and Game is located approximately 15 miles south of Dixon in Solano County. The reserve occurs between the Jepson Prairie Preserve, an area of vernal pools and native grassland, and extensive tracts of reclaimed land in the Sacramento River delta. The 985 acre Calhoun Cut parcel contains unique mosaic of remnant delta marshes and valley grassland/vernal pool habitat.

Decker Island Wildlife Area

The California Department of Fish and Wildlife owns the northernmost 33 acres of Decker Island. Since 1999, CDFW and Department of Water Resources (DWR) have been working together to re-establish and enhance wetland and upland habitats to benefit various species of fish and wildlife.

Fremont Weir Wildlife Area

The Fremont Weir Wildlife Area is located west of the Lower Sacramento River Region Boundary. It consists of 1,461 acres of tall weedy vegetation, brush, valley oaks, willows and cottonwood trees.

Miner Slough Wildlife Area

Miner Slough Wildlife Area, managed by the California Department of Fish and Wildlife, is located about 10 miles north of Rio Vista at the junction of Miner Slough and Cache Slough. The wildlife area is 37 acres in size and makes up one small island and a narrow peninsula extending from Prospect Island. The wildlife area has riparian vegetation of willows, cottonwoods, tules, and blackberries. This habitat supports a variety of wildlife species, including beaver, black-crowned night heron, and a variety of waterfowl.

Sacramento Bypass Wildlife Area

The Sacramento Bypass Wildlife area is a 360-acre area preserve managed by the California Department of Fish and Wildlife. This area is an important cover and feeding area for wildlife during late fall, winter, and early spring. Vegetation varies throughout the area from mature cottonwood trees, willows and valley oaks.

Stone Lakes National Wildlife Areas

Stone Lakes National Wildlife Area, located south of the Lower Sacramento River Region, is managed by the US Fish and Wildlife Service. This area contains multiple habitat types. Wetland habitats include seasonal wetlands, perennial wetland, vernal pools, and some artificial seasonal wetlands. It also includes riparian habitat as well as grasslands and oak woodlands.

White Slough Wildlife Area

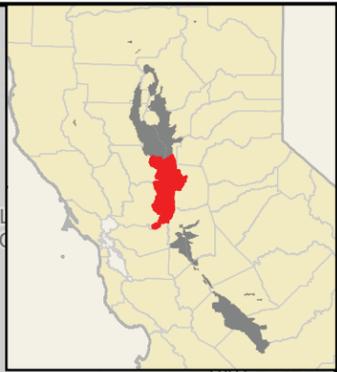
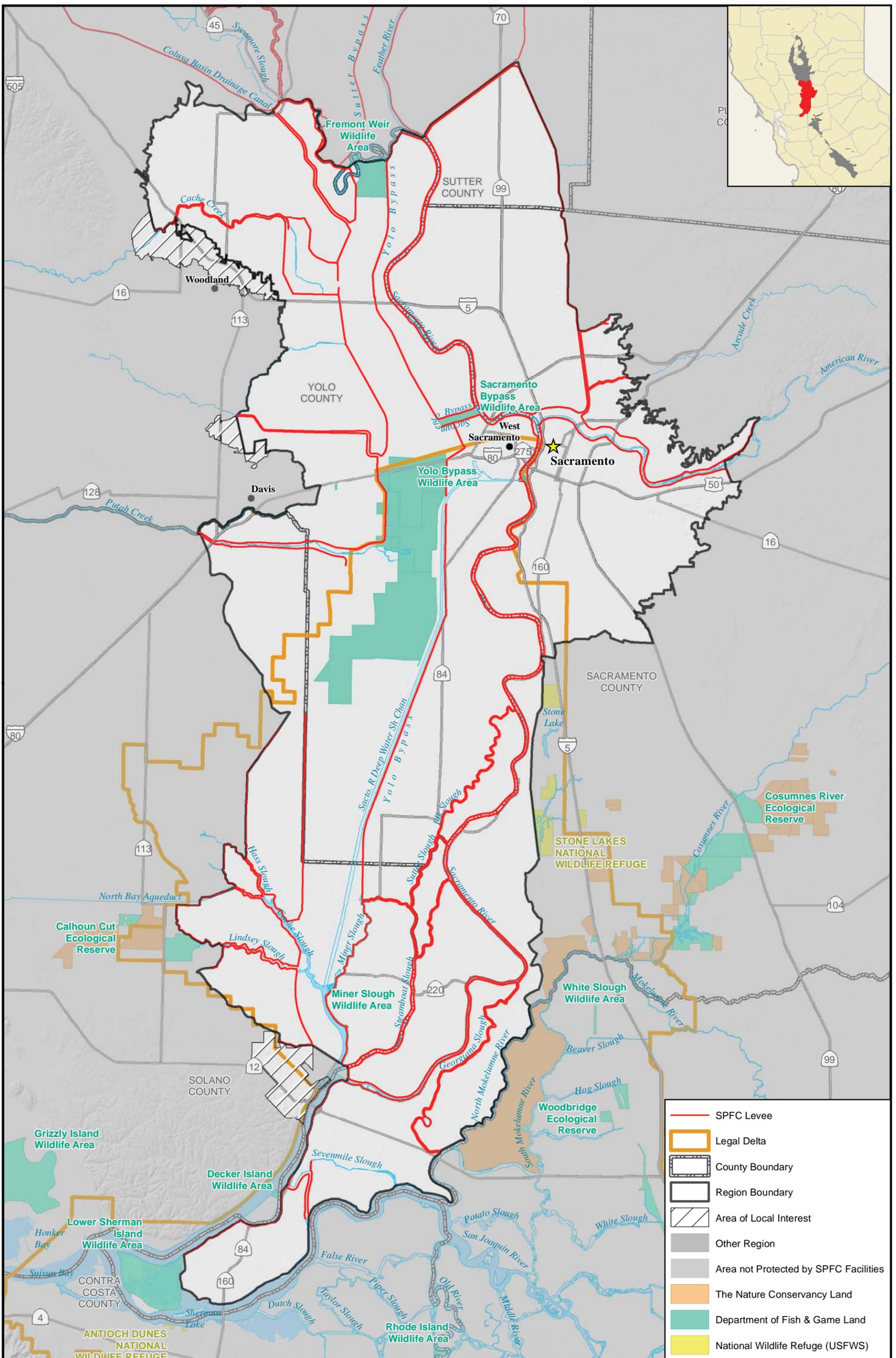
White Slough, managed by the California Department of Fish and Wildlife, contains 880 acres of man-made ditches, canals (burrow ponds), freshwater marshes, grassland/upland riparian habitat. Ponds were created during the construction of I-5.

Yolo Bypass Wildlife Area

The 16,000-acre Yolo Wildlife Area, managed by The California Department of Fish and Wildlife, includes 3,700-acres of land in the Yolo Bypass floodway restored to wetlands and other associated habitats. The wildlife area is located within the boundaries of the Yolo Bypass.



Federal and State managed lands provide habitat for wildlife



1" = 4 miles
 0 1 2 4 Miles
 Datum: NAD 83 Projection: CA (Teale) Albers
 Zone: N/A Units: meters
 Sources: See Appendix for source citations



Regional Flood Management Planning
Lower Sacramento River / Delta North
Managed Environmental Lands
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FloodSAFE CALIFORNIA		 DEPARTMENT OF WATER RESOURCES MAP 18
Prepared By: K. Miller	Date: May 10, 2013	
File: Z:\Projects\109146\Map18_EnvLands.mxd		

Map 19 – Riparian Vegetation, Critical Habitat, and Endangered and Threatened Species

Riparian Vegetation

Riparian vegetation is a habitat type that is characterized by trees, other vegetation and physical features normally found on the stream banks and flood plains associated with streams, lakes, or other bodies of water. Riparian systems provide several important functions to both the aquatic and terrestrial ecosystems associated with them. These include, but are not limited to, stream bank stabilization, flow moderation and flood control, sediment control, organic matter necessary to support aquatic communities, water quality improvement by filtration, temperature moderation by shading, and stream structural diversity. Riparian habitats support a great diversity of wildlife, including sensitive invertebrates, amphibians, reptiles, birds, and mammals.

Riparian vegetation occurs throughout the Lower Sacramento River/Delta North region. Within the Region, riparian vegetation occurs intermittently and concentrated around waterways, including the American River, Sacramento River, and their tributaries.

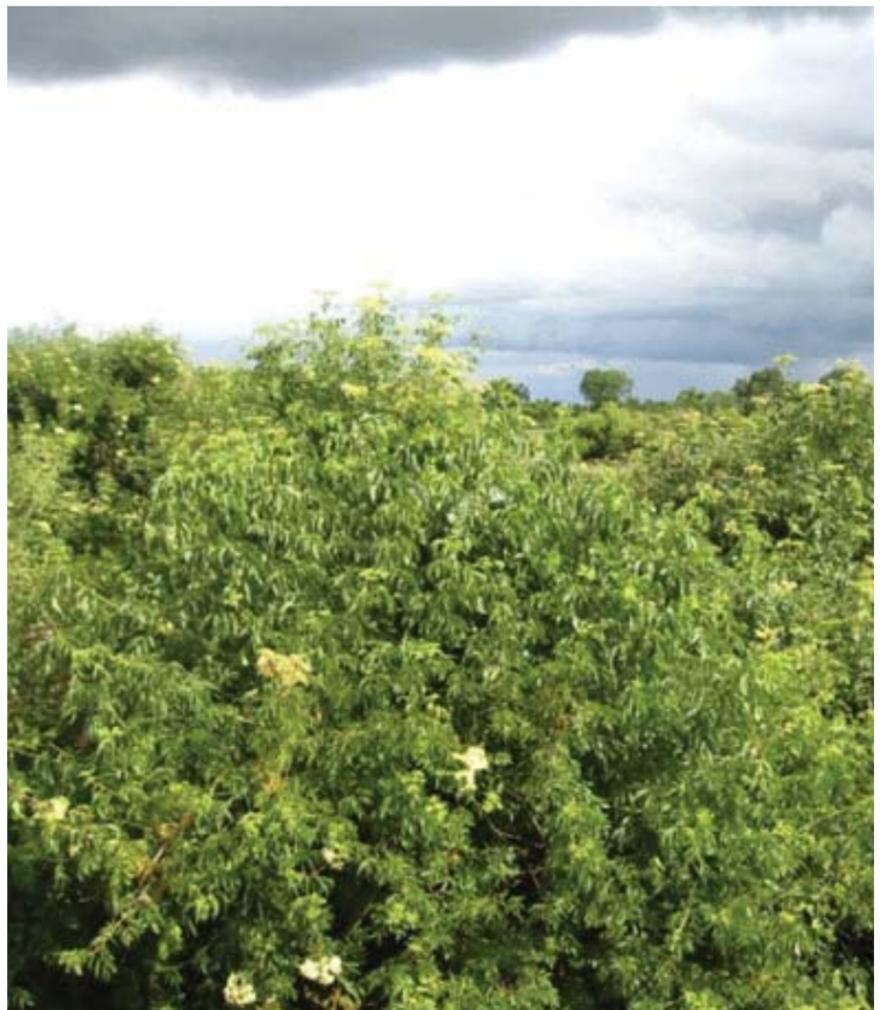
Designated Critical Habitat

Designated Critical habitat is a term defined in the Endangered Species Act and used by US Fish and Wildlife Service and the National Marine Fisheries Service. Designated Critical Habitat is a geographic area that is essential for the conservation and recovery of a federally threatened or endangered species that requires special management and protection. It may include an area that is not currently occupied by the species but that will be needed for its recovery. Critical habitats are designated to ensure that actions authorized by federal agencies will not destroy or adversely modify critical habitat, thereby protecting areas necessary for the conservation of the species. Not all federally listed species have designated critical habitat.

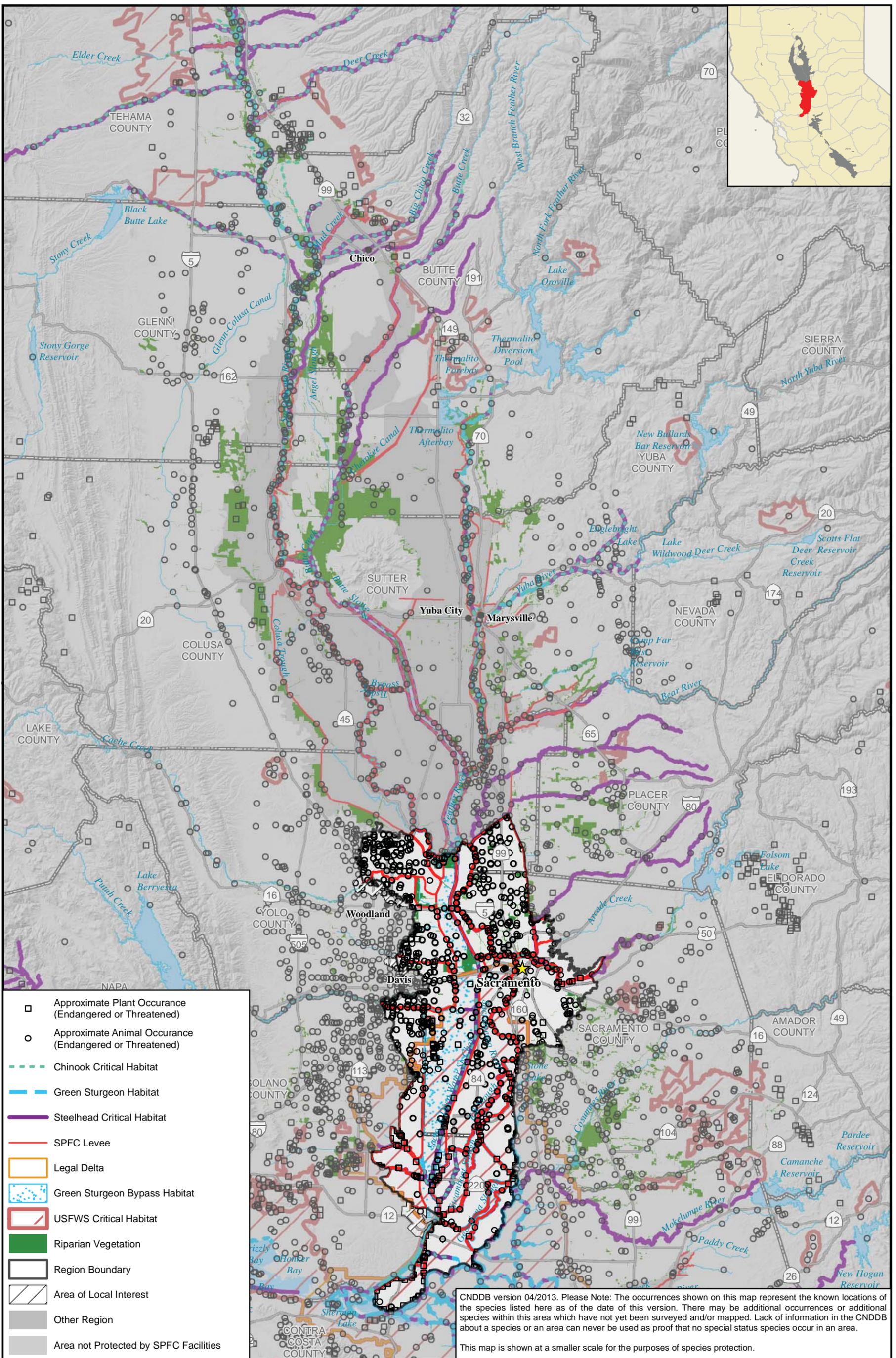
Endangered and Threatened Species

Species with land designated as critical habitat in the Lower Sacramento River/Delta North Region include the Delta smelt (*Hypomesus transpacificus*), Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Central Valley steelhead (*Anadromous O. mykiss*) Central Valley Chinook salmon (*Oncorhynchus tshawytscha*), and Green sturgeon (*Acipenser medirostris*).

Note: Endangered and Threatened species data shown are representative of occurrence areas defined by the California Natural Diversity Database.



The Lower Sacramento River Region contains designated critical habitat for the Delta smelt and Valley elderberry longhorn beetle



CNDDDB version 04/2013. Please Note: The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDDB about a species or an area can never be used as proof that no special status species occur in an area.

This map is shown at a smaller scale for the purposes of species protection.

1" = 10 miles

0 2.5 5 10 Miles

Datum: NAD 83 Projection: CA (Teale) Albers
Zone: N/A Units: meters

Sources: See Appendix for source citations

Regional Flood Management Planning

Lower Sacramento River / Delta North

Riparian Vegetation, Critical Habitat, and

DRAFT Endangered and Threatened Species DRAFT

FloodSAFE CALIFORNIA

DEPARTMENT OF WATER RESOURCES

Prepared By: K. Miller

Date: May 10, 2013

MAP 19

File: Z:\Projects\109146\Map19_CriticalHabitat.mxd

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Glossary

100-year flood event	The flood having a 1-in-100 (1 percent) chance of being equaled or exceeded in any given year. A structure located within a special flood hazard area shown on a National Flood Insurance Program map has a 26% chance of suffering flood damage during the term of a 30 year mortgage. <i>Federal Emergency Management Agency, http://www.fema.gov/, accessed February 2013</i>
200-year floodplain	An area that has a 1-in-200 (0.5 percent) chance of flooding in any given year, based on hydrological modeling and other engineering criteria accepted by the Department of Water Resources. <i>California Government Code Section 65300.2(a)</i>
conveyance capacity	The maximum rate of flowing water, usually expressed in cubic feet per second (cfs), that a river, canal, or bypass can carry without exceeding a threshold value such as flood discharge, or without using the freeboard distance from the top of a levee.
designated floodway	Means the channel of a stream and that portion of the adjoining flood plain required to reasonably provide for the construction of a project for passage of the design flood including the lands necessary for construction of project levees.
essential public facilities	Essential public facilities include, but not limited to, hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities. <i>California Government Code Section 65302</i>
flood basin	A bowl-shaped, natural landform that historically or presently receives and retains floodwaters, or an engineered floodwater detention basin, excavated below grade or surrounded by levees.
flood bypass	An engineered wide and shallow channel or confined floodplain, usually flanked by levees, that receives floodwaters to reduce the amount of flow in a river or stream.
flood corridor	A passageway for floodflows, including, but not limited to, bypass systems, channels, levee systems, floodplain easements, culverts, floodwalls, or a combination thereof.
floodway, State-designated	The channel of a stream and that portion of the adjoining floodplain required to reasonably provide for construction of a project for passage of the design flood, including the lands necessary for construction of project levee that are regulated by the Central Valley Flood Protection Board.
freeboard	Vertical distance from the normal water surface to the top of a confining wall.
integrated flood management	An approach to dealing with flood risk that recognizes the interconnection of flood management actions within broader water resources management and land use planning; the value of coordinating across geographic and agency boundaries; the need to evaluate opportunities and potential impacts from a system perspective; and the importance of environmental stewardship and sustainability. <i>California Department of Water Resources, Draft FloodSAFE Strategic Plan, June 2008</i>
local jurisdiction	Means a city, city and county, or county.
Levee Flood Protection Zone	An area that is protected, as determined by the Central Valley Flood Protection Board or the Department of Water Resources, by a levee that is part of the facilities of the State Plan of Flood Control, as defined under Section 5096.805 of the Public Resources Code. <i>California Government Code Section 65300.2(b)</i>
maintaining agency	Maintaining agency means any city, county, district or other political subdivision of the State that is authorized to maintain levees. The California Department of Water Resources maintains levees pursuant to California Water Code Sections 8361 and 12878, but is not considered a maintaining agency.
non-project levee	Any levee that is not part of the State Plan of Flood Control (CWC 9602(c)) or other State-federal or local-federal flood protection facilities. Nonproject levees are typically privately owned or under the authority of a local levee district. ¹
non-SPFC levee	Any levee that is not part of the State Plan of Flood Control (CWC 9602(c)). This includes State-federal levees outside the Sacramento and San Joaquin river watersheds and levees within the Sacramento and San Joaquin river watersheds that do not have documented State assurances of nonfederal cooperation to the federal government or State responsibility identified in CWC Section 8361.
project levee	Any levee that is a facility of the State Plan of Flood Control. ¹ <i>California Water Code 9602 (c) California Water Code 9602 (c)</i>
riparian area	Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. Riparian areas include portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines.

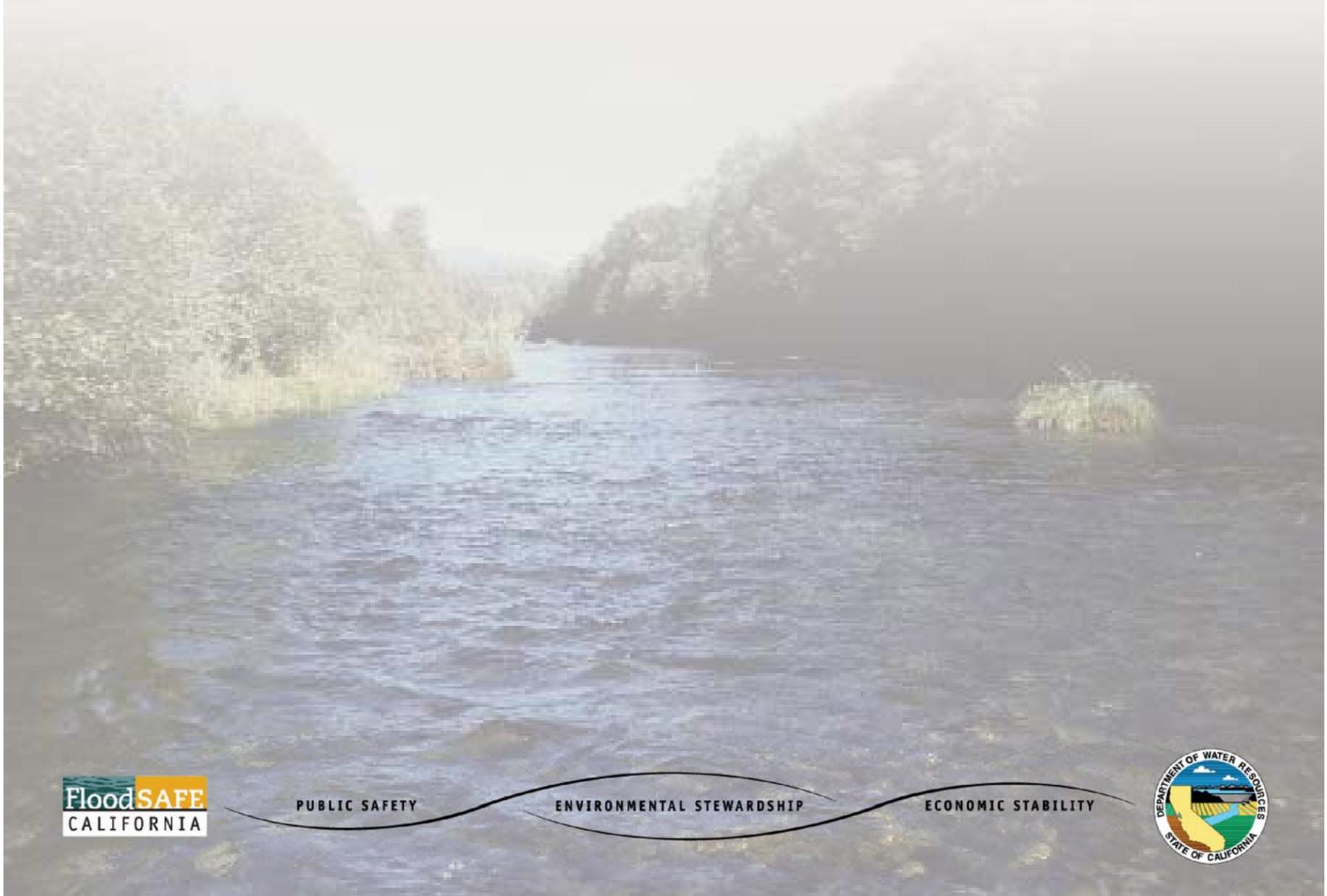
rural community	A city, town, or settlement outside of urban and urbanizing areas with an expected population of less than 10,000 within the next 10 years.
Sacramento-San Joaquin Drainage (SSJD) District	Comprises more than 1.9 million acres in the Central Valley generally along and adjacent to the Sacramento and San Joaquin rivers. SSJD District was created in 1913 by the California Legislature to allow survey work and the collection of data of the San Joaquin and Sacramento rivers and tributaries to prepare a report to the Central Valley Flood Protection Board to further the Board's plans for controlling the floodwaters of the rivers, improve and preserve navigation, and the reclamation and protection of the lands that are susceptible to overflow from those rivers and their tributaries. The District's management and control is vested in the Central Valley Flood Protection Board, and according to the Statute, the District can "acquire, own, hold, use, and enjoy any and all properties necessary for the purposes of the District." <i>Central Valley Flood Protection Board, http://www.cvfpp.ca.gov/, accessed June 2009</i>
Sacramento-San Joaquin River Flood Management System	The Sacramento-San Joaquin River Flood Management System comprises all of the following: (a) The facilities of the State Plan of Flood Control as that plan may be amended by the Central Valley Flood Protection Board; (b) Any existing dam, levee, or other flood management facility that is not part of the State Plan of Flood Control if the board determines, upon recommendation of the department, that the facility does one or more of the following: (1) Provides significant systemwide benefits for managing flood risks within the Sacramento-San Joaquin Valley. (2) Includes project levees that protect a contiguous urban area of 10,000 or more residents within the Sacramento- San Joaquin Valley. <i>California Water Code Sections 9602 and 9611</i>
small community	Developed area with a population of less than 10,000.
State Plan of Flood Control	Means the state and federal flood control works, lands, programs, plans, policies, conditions, and mode of maintenance and operations of the Sacramento River Flood Control Project Described in Section 8350 of the California Water Code (CWC), and of flood control projects in the Sacramento River and San Joaquin River watersheds authorized pursuant to Article 2 (commencing with Section 12648) of Chapter 2 of Part 6 of Division 6 for which the Board or the Department has provided the assurances of nonfederal cooperation to the United States, and those facilities identified in CWC Section 8361. <i>California Water Code Section 9110 (f)</i>
State Plan of Flood Control Descriptive Document	The State Plan of Flood Control Descriptive Document is an inventory and description of the flood control projects and works (facilities), lands, programs, plans, conditions, and modes of operations and maintenance for the State-federal flood protection system in the Sacramento River and San Joaquin River watersheds and facilities identified in WC Section 8361. The document fulfills part of the legislative requirement expressed in CWC Section 9120 (a) and (b).
State Plan of Flood Control Planning Area	The State Plan of Flood Control (SPFC) Planning Area is the geographic area that includes the lands currently receiving flood damage reduction benefits from the SPFC. The SPFC Planning Area is completely contained within the Systemwide Planning Area.
urban area²	A developed area in which there are 10,000 residents or more. <i>California Government Code Section 65007 (j)</i>
urbanizing area	A developed area or an area outside a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years. <i>California Government Code Section 65007 (k)</i>
urban levee design criteria	Urban Levee Design Criteria (ULDC) means the levee and flood-wall design criteria developed by the California Department of Water Resources for providing the urban level of flood protection. <i>California Government Code Section 65007(k) and Water Code Section 9602(i)</i>
urban level of flood protection	Level of protection that is necessary to withstand flooding that has a 1-in-200 chance of occurring in any given year using criteria consistent with, or developed by, the Department of Water Resources. <i>California Government Code Section 65007(l) and Water Code Section 9602(i)</i>

¹Disclaimer: It is important for the reader to understand that a broader definition is often used to describe a project levee as any levee that has been implemented as part of a Federal project. For use with respect to the CVFPP, "project levee" is as defined in the Water Code.

²"Urban Area" is also defined in the California Public Resources Code Section 5096.805 (k) as "any contiguous area in which more than 10,000 residents are protected by project levees." For use with respect to the Central Valley Flood Protection Plan, "project levee" is as defined in California Water Code Section 9602(c).

Lower Sacramento River/Delta North Region
Regional Flood Atlas–Draft

REGIONAL FLOOD
MANAGEMENT PLANNING



PUBLIC SAFETY

ENVIRONMENTAL STEWARDSHIP

ECONOMIC STABILITY

